STRUCTURE OF MICROCARD

A01/1 = Structure of microcard

A03/1 = Special features

B01/1 = Disassembly of alternator

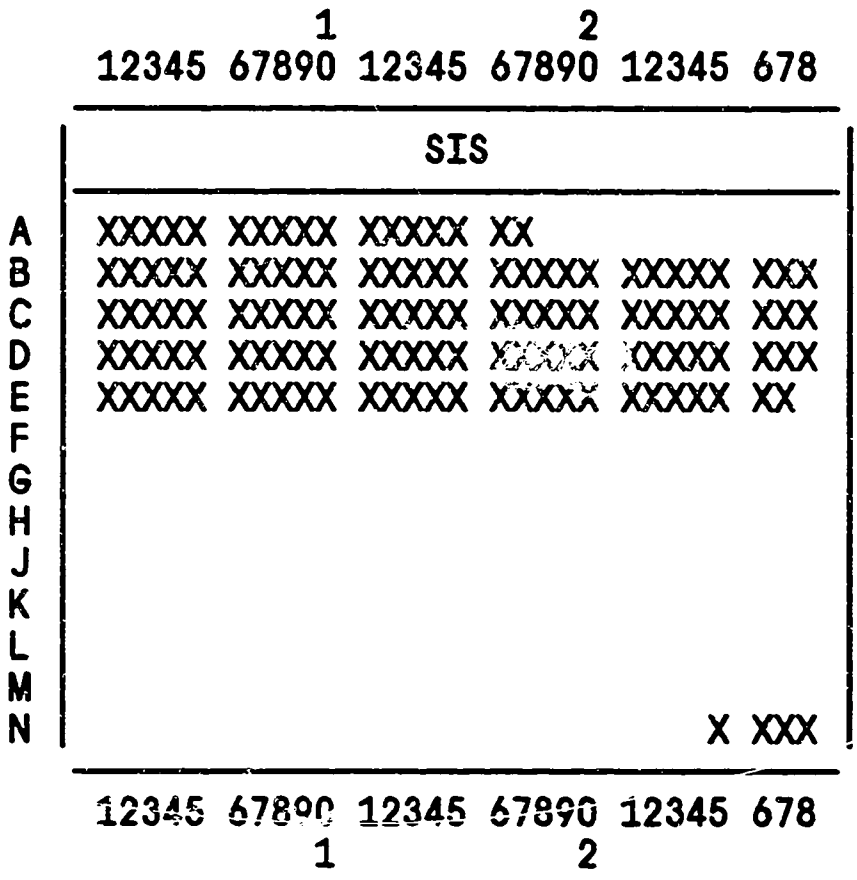
B27/1 = Assembly of alternator

N25/1 = Index

N26/1 = Table of contents

N28/1 = Editorial note

Continue: A02/1 Fig.: A01/2



Continue: A02/1

DESCRIPTION OF TROUBLE-SHOOTING INSTRUCTIONS

These trouble-shooting instructions are designed to outline the correct procedure to be employed when performing trouble-shooting on alternators.

Continue: N1

DESCRIPTION OF TROUBLE-SHOOTING INSTRUCTIONS

User prompting is provided on every page e.g.:
- Continue: B17/1
- Continue: B18/1 Fig.: B17/2
- Yes: B18/1 No: B15/1
- Yes: B17/1 No: B16/1 Fig.: B15/2

.../1 = upper coordinate half
.../2 = lower coordinate half

Continue: A03/1

SPECIAL FEATURES

The microcard contains repair and testing instructions together with the corresponding test specifications for the alternators 0 120 45. .., 0 120 46. ..

N1 (RL) 14V
32/65 A, 32/70 A, 31/75 A, 29/80 A, 31/80 A, 36/80 A, 29/90 A, 32/90 A, 34/90 A, 40/90 A, 31/100A, 36/100A, 40/100A, 35/105A, 35/110A, 40/110A, 10/115A, 35/115A, 40/115A, 25/135A, 25/140A.

Continue: A03/2

SPECIAL FEATURES

N o t e :

Use was made of the alternator 0 120 469 532 in compiling these repair and testing instructions.

The various alternator versions are to be taken from the corresponding service-part microcards.

Continue: A04/1

ELECTRICAL TEST SPECIFICATIONS

Suppression capacitor 1.8...2.6 microfarads

Load current less than/equal to 10 A
Test speed 6000 min-1

Regulator Part No. 0 192 052 ...	Type	Regulator voltage (V)
..001, ..002, ..004 ..005, ..006, ..007 ..008, ..010, ..011 ..012, ..013, ..014 ..015, ..016, ..017	EE 14V 3	13.7-14.5

Continue: A04/2

ELECTRICAL TEST SPECIFICATIONS

Regulator Part No. 0 192 052 ...	Type	Regulator voltage (V)
..018, ..020, ..021 ..022, ..024, ..025 ..026, ..027	EE 14V 3	13.7-14.5
..019, ..023,	EE 14V 3	14.3-14.9

Continue: A05/1

ELECTRICAL TEST SPECIFICATIONS

Regulator Part No. 1 197 311 ...	Type	Regulator voltage (V)
..001, ..003, ..004 ..005, ..009, ..010 ..011, ..021, ..023 ..027, ..030,	EL14V4B,C 3C,	13.7–14.5
..008, ..026, ..028	EL 14V 3C	14.1–14.9
..800,	EL 14V 4C	14.1–14.9

Continue: A05/2

ELECTRICAL TEST SPECIFICATIONS

Resistance values

Type N1 –> 14V	Stator Ohms + 10%	Rotor Ohms + 10% up to DM 152	Rotor Ohms + 10% as of DM 241
32 / 65 A	0.1	3.4	2.9
32 / 70 A	0.1	2.9	—
31 / 75 A	< 0.1	3.4	2.9
29 / 80 A	< 0.1	3.4	2.9
31 / 80 A	< 0.1	—	2.6
36 / 80 A	< 0.1	3.4	2.6
29 / 90 A	< 0.1	3.4	2.6

Continue: A06/1

ELECTRICAL TEST SPECIFICATIONS

Resistance values

Type N1 -> 14V	Stator Ohms + 10%	Rotor Ohms + 10%
32 / 90 A	< 0.1	2.6
34 / 90 A	< 0.1	2.6
40 / 90 A	< 0.1	1.8
31 / 100 A	< 0.1	2.6
36 / 100 A	< 0.1	2.6
40 / 100 A	< 0.1	2.6
35 / 105 A	< 0.1	2.6

Continue: A06/2

ELECTRICAL TEST SPECIFICATIONS

Resistance values

Type N1 -> 14V	Stator Ohms + 10%	Rotor Ohms + 10%
35 / 110 A	< 0.1	2.6
40 / 110 A	< 0.1	2.6
10 / 115 A	< 0.1	2.6
35 / 115 A	< 0.1	2.6
40 / 115 A	< 0.1	2.6
25 / 135 A	< 0.1	2.6
25 / 140 A	< 0.1	2.6

Continue: A07/1

PERFORMANCE TEST

Testing of alternator with regulator:
The alternator voltage of 13 V is to be kept constant by varying the load current IL.

Type	Speed (min-1)	Load (A)
N1->14V32/65A	1 500	32
	6 000	62
N1->14V31/70A	1 500	31
	6 000	66
N1->14V31/75A	1 500	33
	6 000	70

Continue: A07/2

PERFORMANCE TEST

Type	Speed (min-1)	Load (A)
N1->14V29/80A	1 500	31
	6 000	75
N1->14V31/80A	1 500	33
	6 000	78
N1->14V36/80A	1 500	38
	6 000	77
N1->14V29/90A	1 500	32
	6 000	85

Continue: A08/1

PERFORMANCE TEST

Type	Speed (min-1)	Load (A)
N1->14V32/90A	1 500	37
	6 000	89
N1->14V34/90A	1 500	38
	6 000	86
N1->14V40/90A	1 500	42
	6 000	84
N1->14V31/100A	1 500	33
	6 000	93

Continue: A08/2

PERFORMANCE TEST

Type	Speed (min-1)	Load (A)
N1->14V36/100A	1 500	36
	6 000	100
N1->14V40/100A	1 500	44
	6 000	99
N1->14V35/105A	1 500	37
	6 000	98
N1->14V35/110A	1 500	35
	6 000	110

Continue: A09/1

PERFORMANCE TEST

Type	Speed (min-1)	Load (A)
N1->14V40/110A	1 500	45
	6 000	103
N1->14V10/115A	1 500	10
	6 000	107
N1->14V35/115A	1 500	38
	6 000	107
N1->14V40/115A	1 500	44
	6 000	113

Continue: A09/2

PERFORMANCE TEST

Type	Speed (min-1)	Load (A)
N1->14V25/135A	1 500	35
	6 000	135
N1->14V25/140A	1 500	30
	6 000	138

I m p o r t a n t :
Pay attention to accident prevention regulations!

Following completion of testing, allow alternator (if possible) to run at approx. 10 000 min-1.

Continue: A10/1

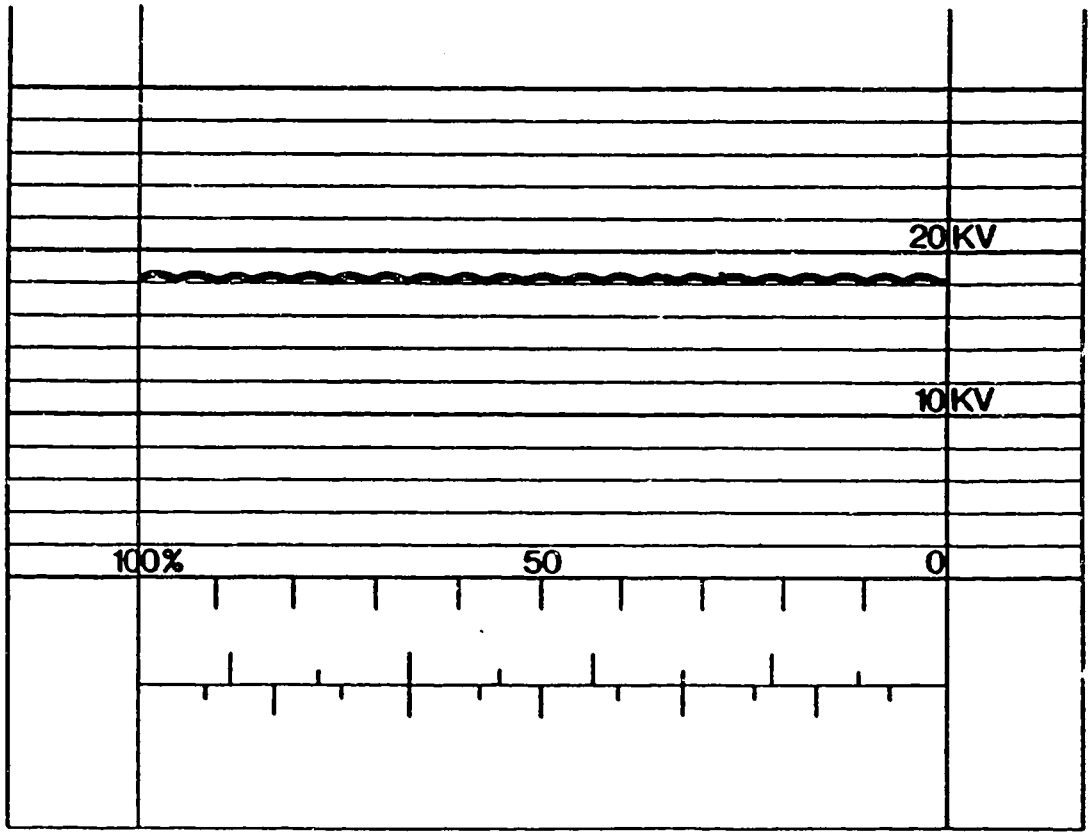
"Go" oscillogram:

This is the image provided by a properly functioning alternator. The D.C. voltage supplied has a small harmonic component.

Small spikes may be superimposed on the oscillogram illustrated if the alternator regulator is in operation.

The regulator can be shut down by connecting up a load (e.g. load impedance).

Continue: A11/1 Fig.: A10/2

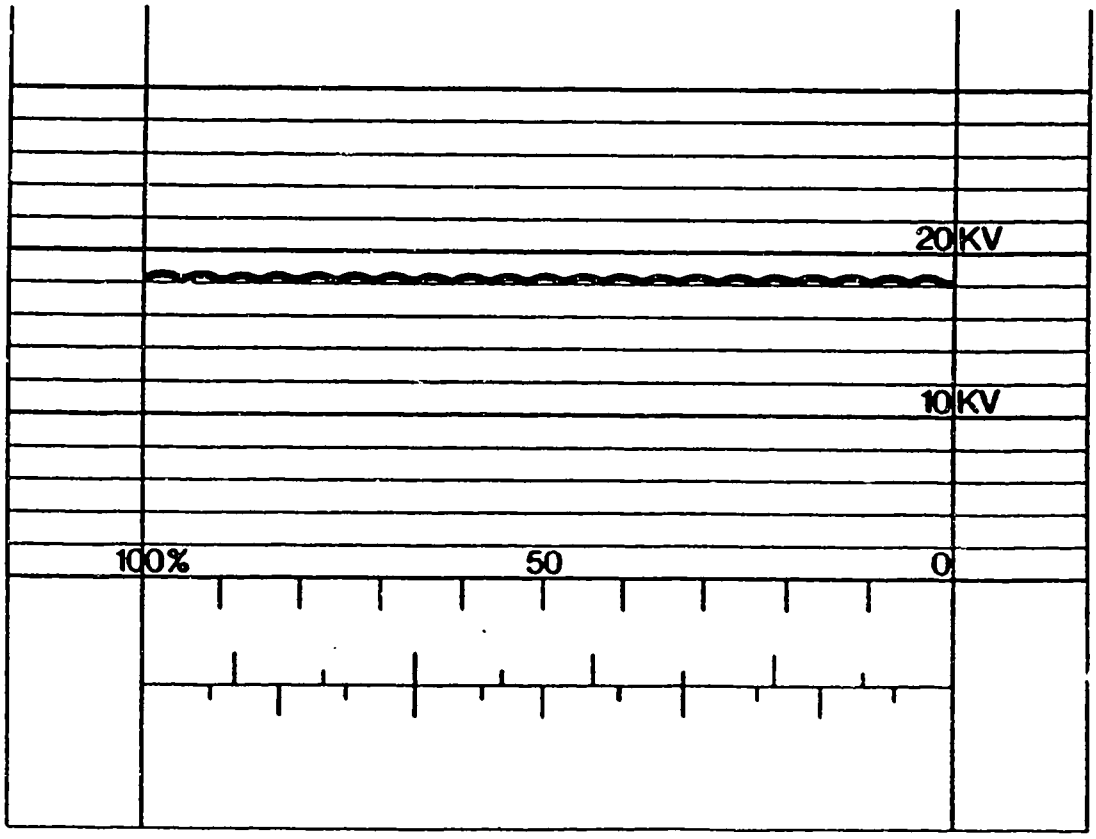


"Go" oscillogram:

In order to be able to compare such images, the respective image is to be adjusted by means of the oscilloscope vertical control such that it approximately fits in between the 10 and 20 kV division.

N o t e : Several faults may occur together.

Continue: A12/1 Fig.: A11/2



MECHANICAL TEST SPECIFICATIONS

One-sided air gap between rotor and stator greater than 0.3 mm

Eccentricity:
Rotor mount at bearing points.

O.D. of rotor 0.05 mm

O.D. of collector rings 0.03 mm

Continue: A12/2

MECHANICAL TEST SPECIFICATIONS

Minimum diameter of collector rings and carbon-brush projection dimension (see table)

Alternators 0 120 45. .. 0 120 46. ..	Collector-ring diameter (mm) new	min. diameter	Carbon-brush pr.d. (mm) new	run-in min.
EE regulator 0 192 052 .. or	27.8 32.5	26.8 31.5	14.0 10.0	5.0 5.0

Continue: A13/1

MECHANICAL TEST SPECIFICATIONS

Minimum diameter of collector rings and carbon-brush projection dimension (see table)

Alternators 0 120 45. .. 0 120 46. ..	Collector-ring diameter (mm) new	min. diameter	Carbon-brush pr.d. (mm) new	min.	run-in min.
EL regulator 1 197 311 ..	27.8	26.8	12-13		5.0
or	32.5	31.5	11-12		5.0

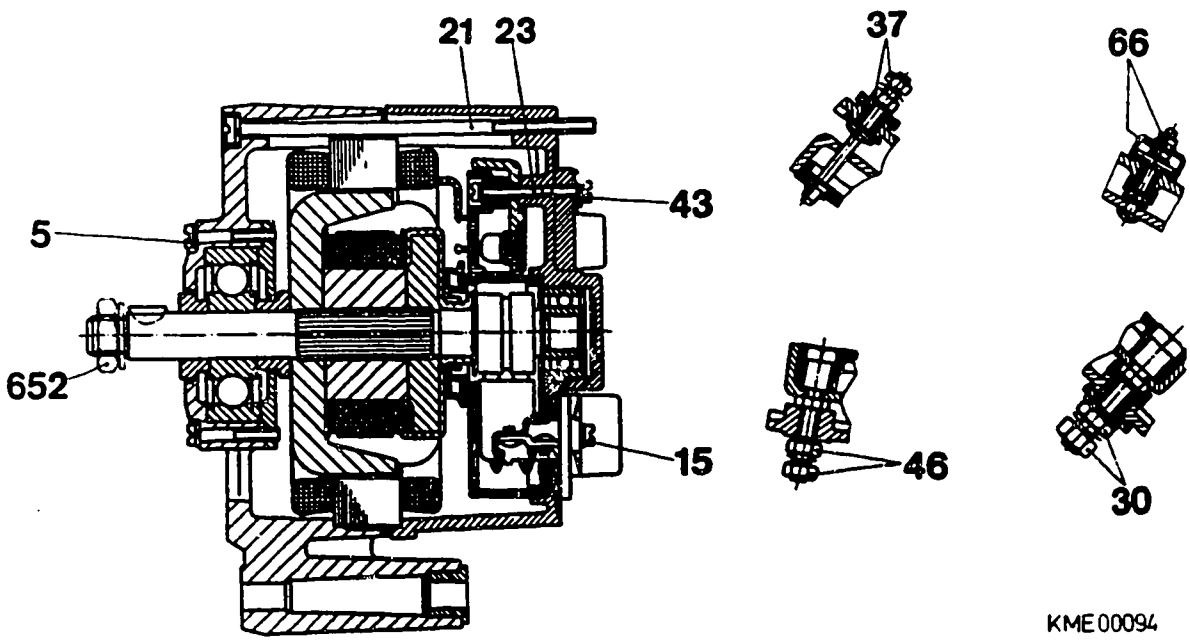
Continue: A14/1

TIGHTENING TORQUES FOR N1 ALTERNATORS
0 120 4..

Item 5 = 2.2 ... 2.9 Nm
Item 15 = 1.6 ... 2.3 Nm
Item 21 = 4.1 ... 5.5 Nm
Item 23 = 1.4 ... 2.0 Nm
Item 30 = 7.5 ... 8.0 Nm
Item 37 = 2.7 ... 3.8 Nm
Item 43 = 1.4 ... 2.0 Nm
Item 46 = 4.8 ... 6.8 Nm
Item 66 = 1.4 ... 2.0 Nm
Item652 = 35 ... 45 Nm *

* For hexagon socket in rotor shaft
  torque increases to 45 ... 55 Nm.

Continue: A15/1 Fig.: A14/2



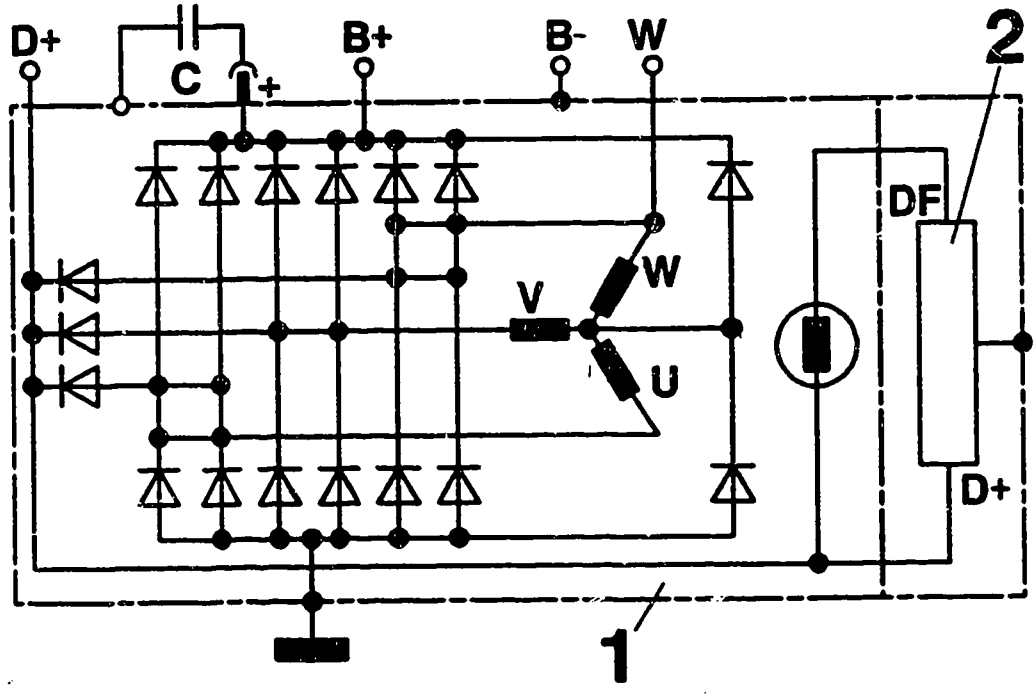
DIAGRAMS:

Alternator N1 (RL) 14V 32/65A
N1 (RL) 14V 29/90A
N1 (RL) 14V 32/90A
N1 (RL) 14V 31/80A
N1 (RL) 14V 40/110A
N1 (RL) 14V 10/115A
N1 (RL) 14V 35/115A
N1 (RL) 14V 40/115A
N1 (RL) 14V 25/135A
N1 (RL) 14V 25/140A

in some cases with terminal W.

1 = Alternator
2 = Regulator

Continue: A16/1 Fig.: A15/2



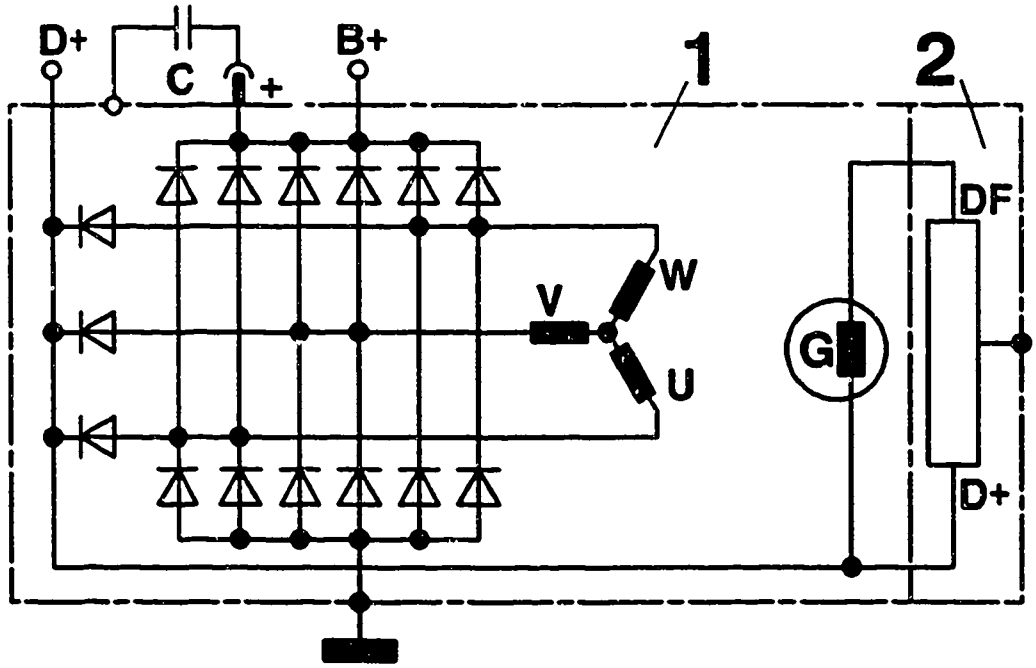
KME 00095

DIAGRAMS:

Alternator N1 (RL) 14V 32/70A
N1 (RL) 14V 31/75A
N1 (RL) 14V 29/80A

1 = Alternator
2 = Regulator

Continue: A17/1 Fig.: A16/2



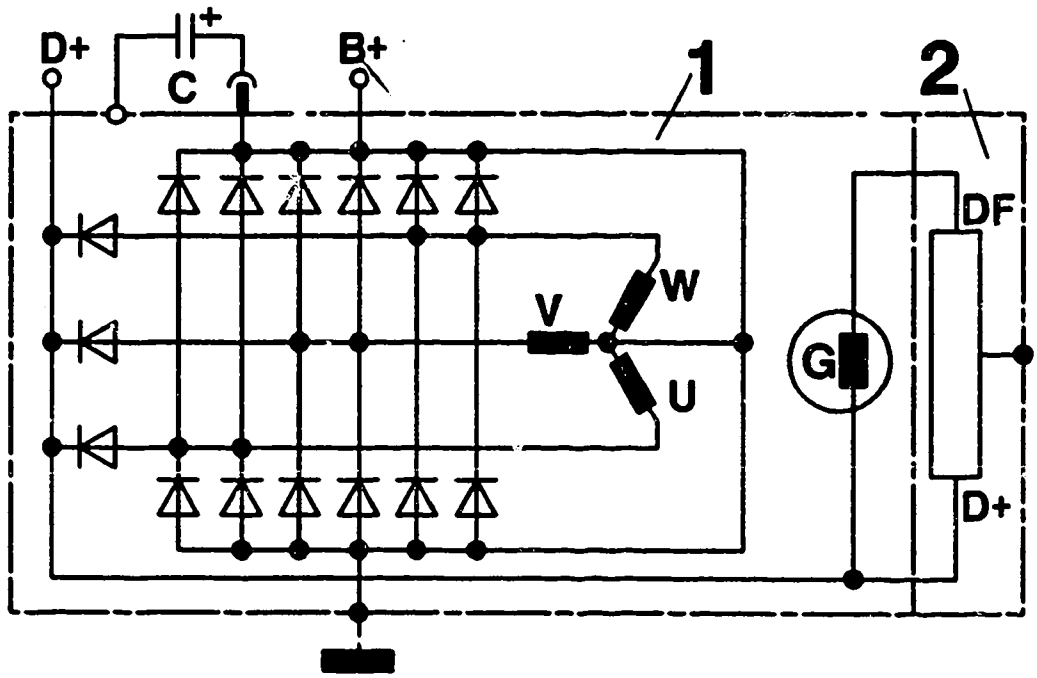
KME 00121

DIAGRAMS:

Alternator N1 (RL) 14V 36/80A
N1 (RL) 14V 34/90A

1 = Alternator
2 = Regulator

Continue: A18/1 Fig.: A17/2

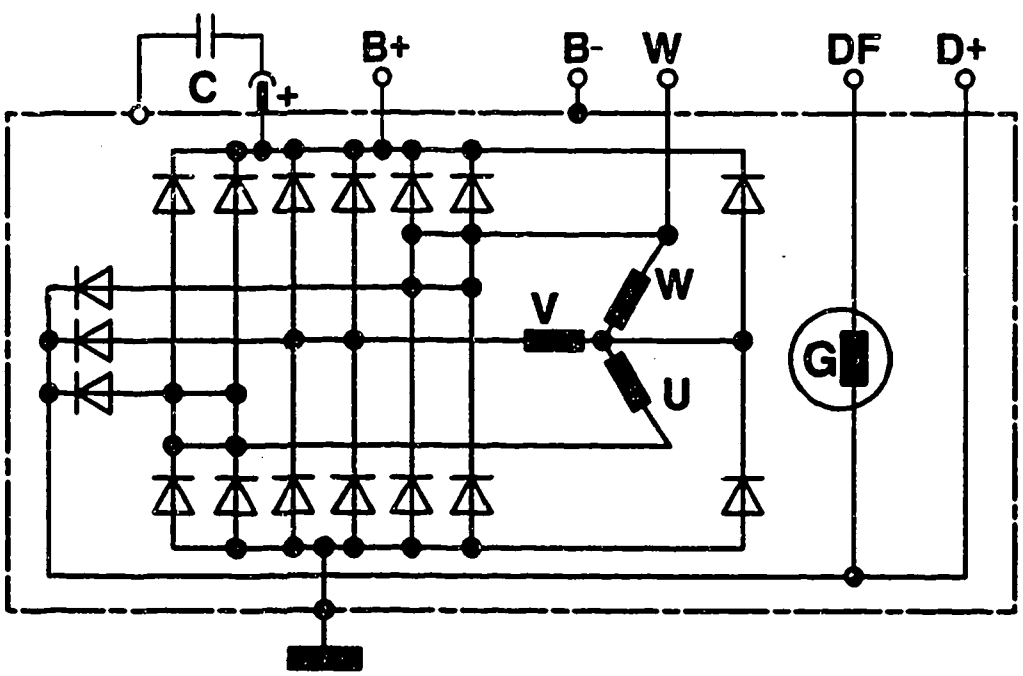


KME 00122

DIAGRAMS:

Alternator with separately mounted regulator
N1 (RL) 14V 32/65A
N1 (RL) 14V 29/90A

Continue: A19/1 Fig.: A18/2

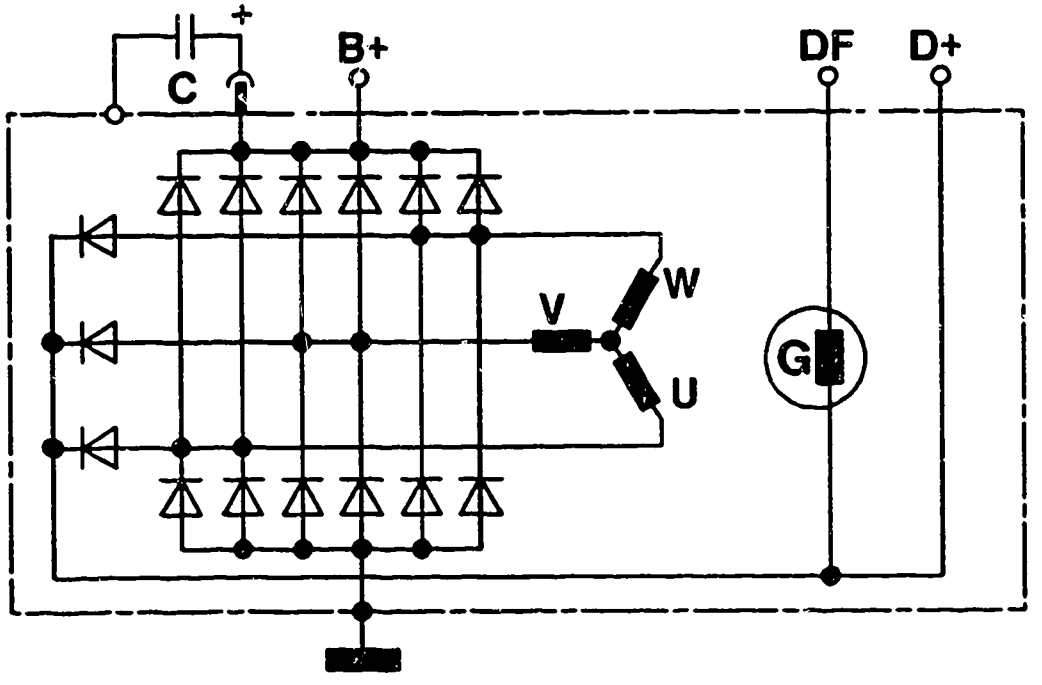


KME 00123

DIAGRAMS:

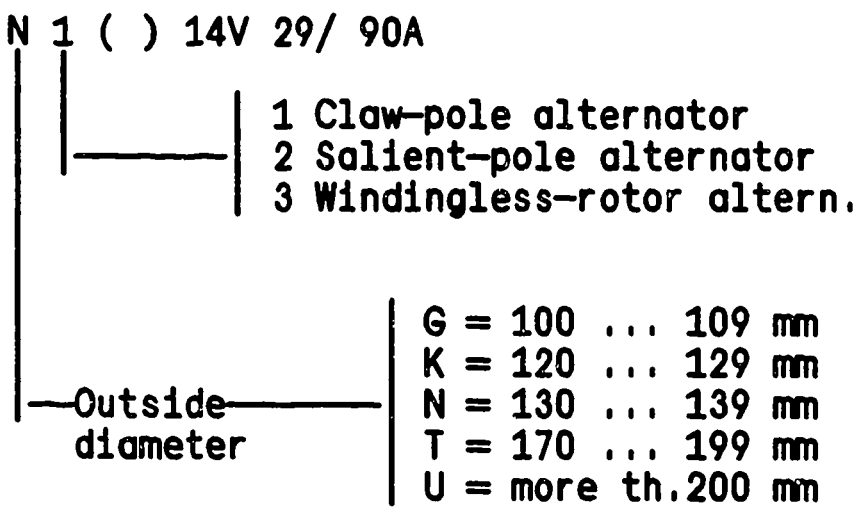
Alternator with separately mounted regulator
N1 (RL) 14V 32/70A
N1 (RL) 14V 31/75A

Continue: A20/1 Fig.: A19/2

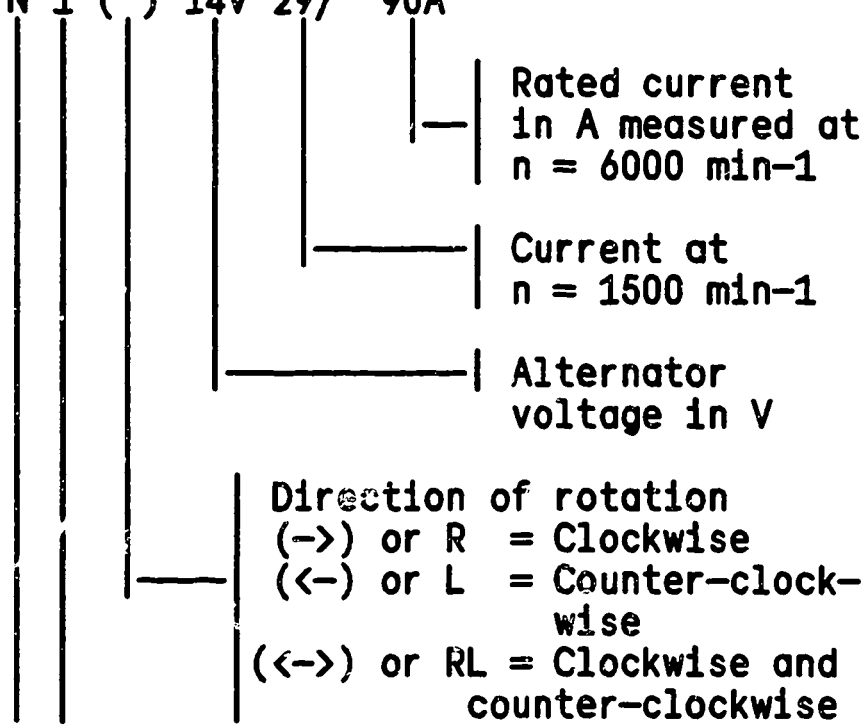


KME 00124

Explanation of type code on alternator
e.g.: N1 () 14 V 29/ 90A



Continue: A20/2



Continue: A21/1

CLEANING OF PARTS

C A U T I O N !
D A N G E R O F F I R E

To provide interference suppression for receivers and transmitters, alternators are fitted with capacitors with a long storage time.

Washing out alternator components may result in capacitor discharge when immersing them in cleaning fluids. This can cause combustible liquids to catch fire.

Continue: A21/2

CLEANING OF PARTS

For this reason, parts featuring capacitors are only to be washed out in HAKU 1025/6.

Continue: A22/1

TESTERS, TOOLS AND ADHESIVES

Testers:

Alternator test bench
EFLJ 25 .. 0 680 110 ...
or EFLJ 70 A 0 680 104 ...
or EFLJ 91 0 683 300 100

or combination test bench
(only for load up to max. 43 A)
EFAW 275 .. 0 681 107 ...

Mounting plate EFLJ 66/3
for clamping alternators with hinge
mounting to alternator test bench
EFLJ 25, 70

Continue: A22/2

TESTERS, TOOLS AND ADHESIVES

Testers:

Parts set 1 687 000 042
for clamping alternators with hinge
mounting to combination test bench
EFAW 275 ..

For additional check or test:

Ignition oscilloscope (all versions)
or
Bosch engine tester (all versions)

Continue: A23/1

TESTERS, TOOLS AND ADHESIVES

Testers:

Test panel	EFAW 81	0 681 169 013
or	KDAW 9984	0 681 269 014
Transformer panel		
	EFAW 82	0 681 169 014
or	KDAW 9995	
Insulation tester		
	EFAW 84	(contained in
	KDAW 9983	scope of delivery of EFAW 81 or KDAW 9984)

Continue: A23/2

TESTERS, TOOLS AND ADHESIVES
Testers:

Dial gauge	EFAW 7	1 687 233 011
Magnetic stand	T-M 1 (EW/MS 1B1	4 851 601 124 0 601 980 001)
Alternator tester		
	EFAW 192	0 681 101 403
or	WPG 012.00	0 684 201 200
3 feeler gauges 0.15...0.6 mm		
	KDZV 7399	
Electric tester		
	ETE 014.00	0 684 101 400

Continue: A24/1

TESTERS, TOOLS AND ADHESIVES

Tools:

Clamping support	KDAW 9999
Mandrel press	(commercially available)

Pressing-out ring for rotor e.g. old stator frame of starting motor

I.D.	105 mm
O.D.	115 mm

Two prisms	(commercially available)
Soldering iron 180 W	(commercially available)

Continue: A24/2

TESTERS, TOOLS AND ADHESIVES
Tools:

Pressing-in mandrel	KDLI 6002
Pressing-on mandrel	KDLI 6004/1
for collector rings	KDLI 6004/0/1
Securing device for pulley	KDLI 6006
Securing device for multi-groove pulley	KDLI 6029
Die spigot for mandrel press	KDLI 6010

Continue: A25/1

TESTERS, TOOLS AND ADHESIVES

Tools:

Socket wrench	KDLI 6030
Socket wrench	KDLI 6031
Hexagon-socket-screw key(8 x 120)	commercially available

Continue: A25/2

TESTERS, TOOLS AND ADHESIVES

Adhesives:

Adhesive dispersion
KK57v1 Part. No. 5 703 151 000

Silicon paste
Ft2v4 Part. No. 5 700 083 005

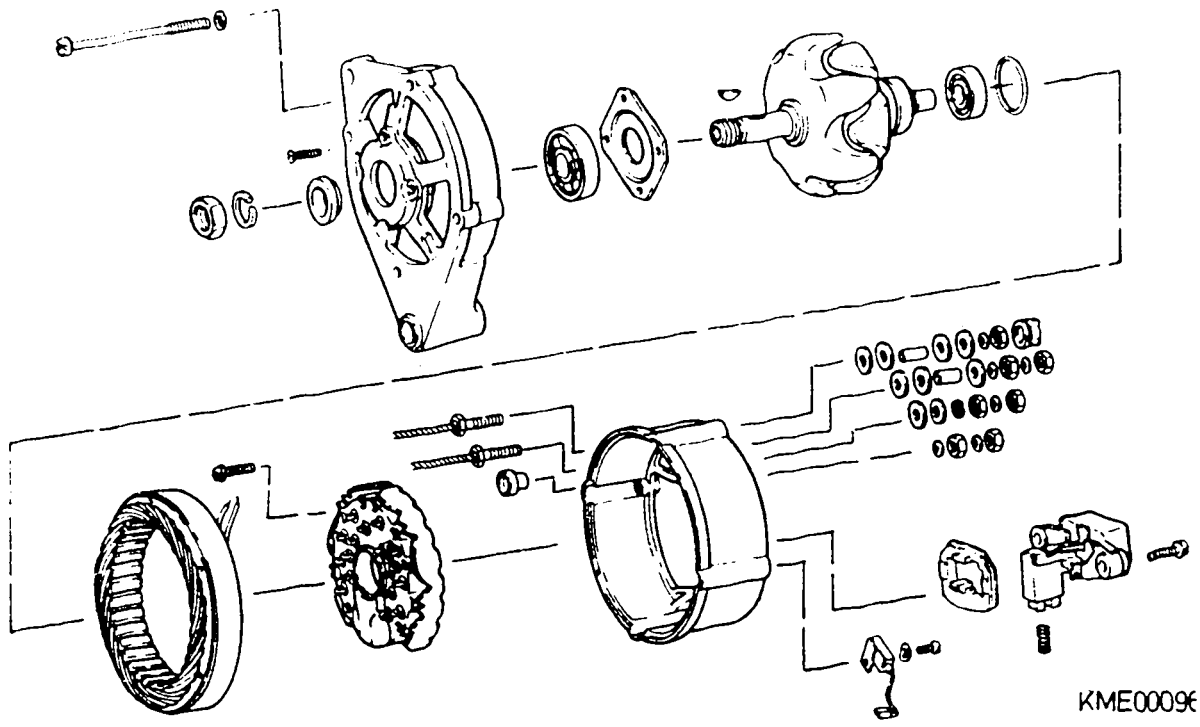
Moisture-proof protective lacquer FS 190
Commercially available
B e c k Isoliersysteme
Hamburg, Postfach

Epoxy resin putty with hardener
VS 11715 Bg Part. No. 5 941 070 110
VS 11716 Bg Part. No. 5 941 080 110

Continue: A26/1

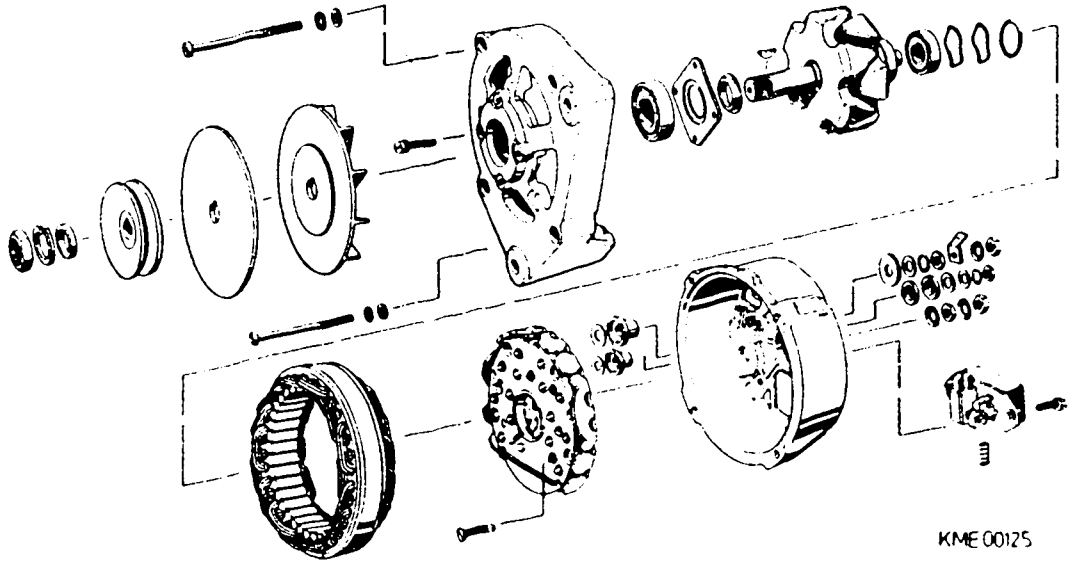
EXPLODED VIEW OF ALTERNATOR
0 120 469 ..

Continue: A27/1 Fig.: A26/2



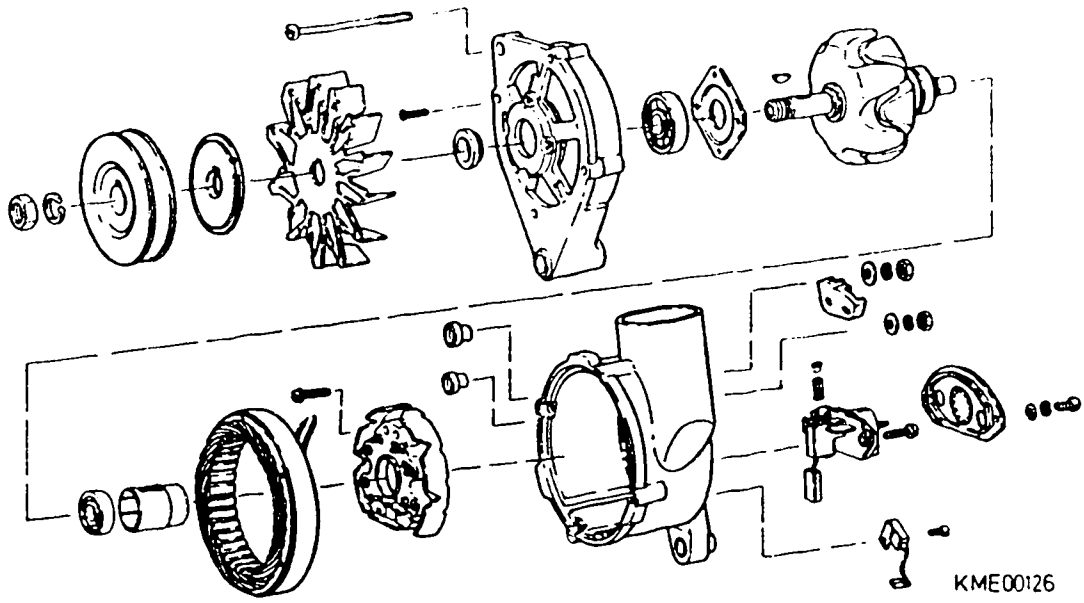
EXPLODED VIEW OF ALTERNATOR
0 120 450 ..

Continue: A28/1 Fig.: A27/2



EXPLODED VIEW OF ALTERNATOR
0 120 468 ..

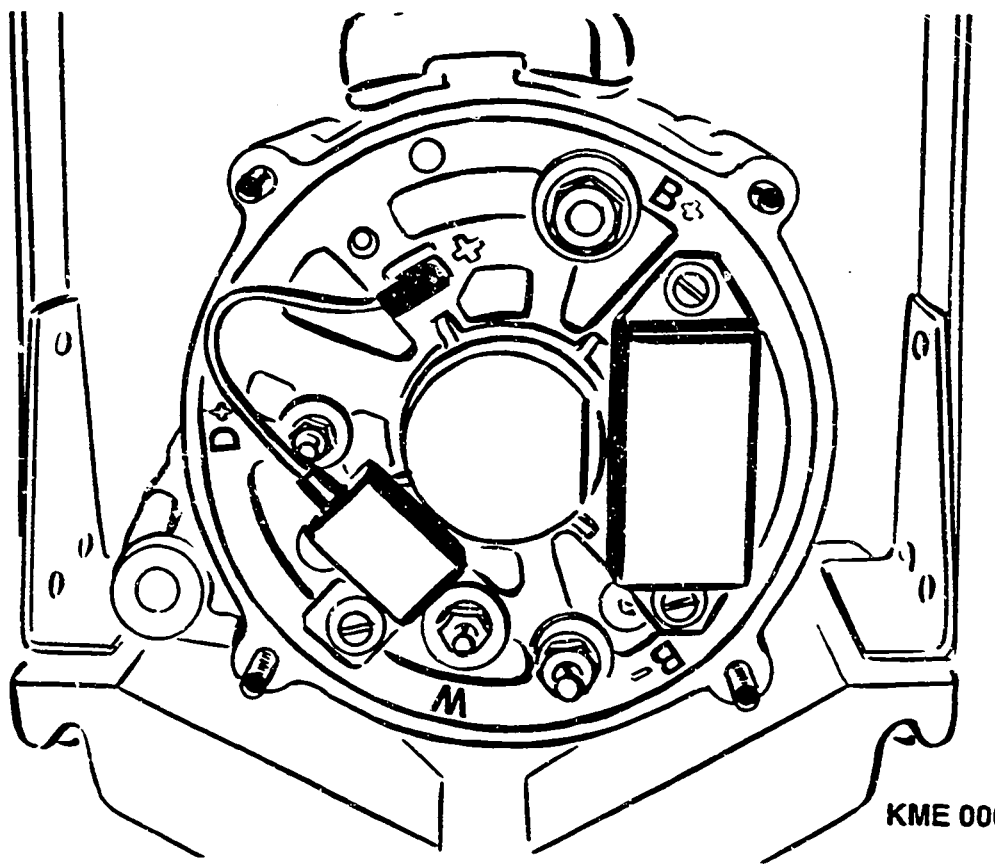
Continue: B01/1 Fig.: A28/2



DISASSEMBLY OF ALTERNATOR AND CHECKING OF COMPONENTS

Clamp alternator in position in clamping support KDAW 9999.

Continue: B02/1 Fig.: B01/2



KME 00097

ALTERNATOR DISASSEMBLY

N o t e :

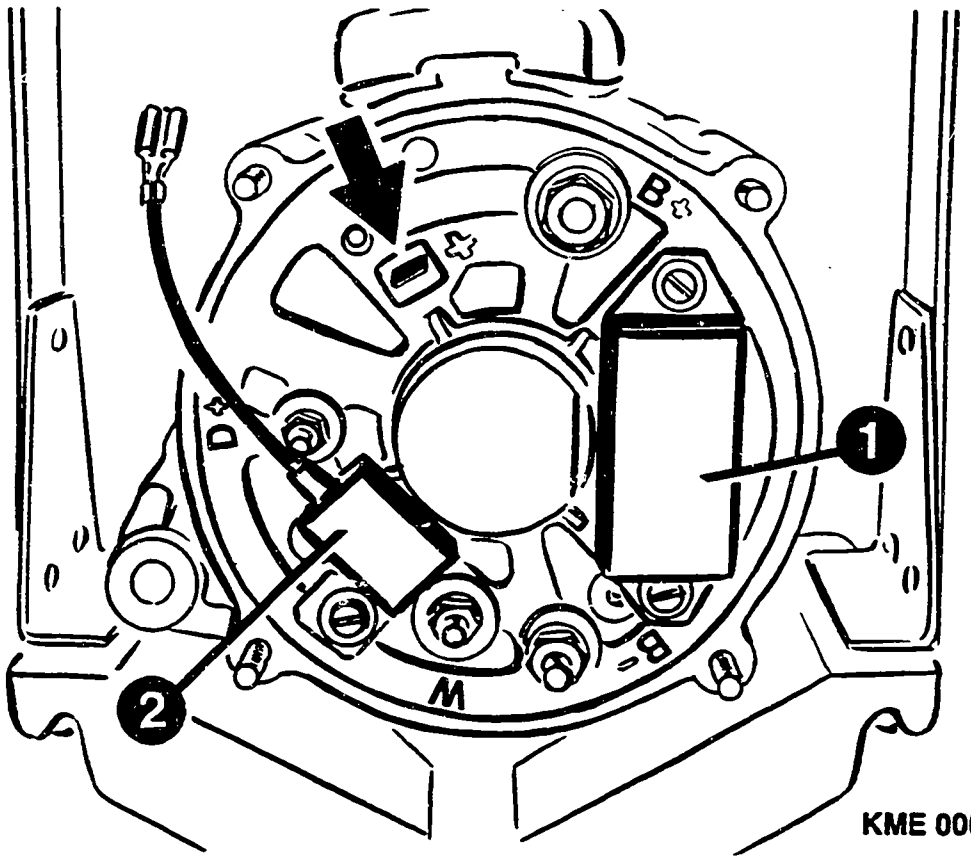
Remove electronic regulator before disassembling alternator.

To do so, unscrew 2 fastening screws of regulator.

If disassembly sequence is not complied with, the carbon brushes will break when pulling the alternator apart.

1 = Electronic regulator with carbon-brush holder
2 = Suppression capacitor

Continue: B03/1 Fig.: B02/2



KME 00098

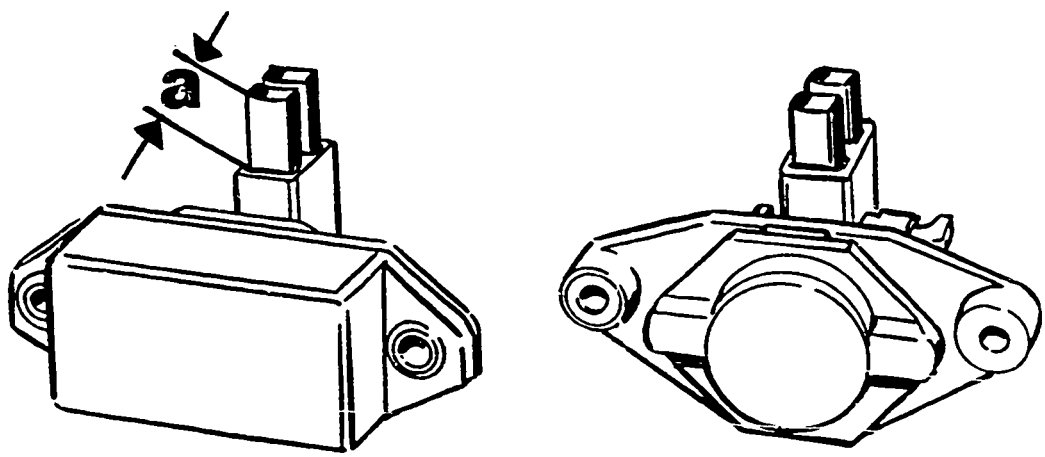
ALTERNATOR DISASSEMBLY

Check regulator for external damage and carbon-brush replacement:

Replace carbon brushes if they have broken off or if projection dimension "A" is less than 7 mm.

Comply with projection dimension "A" when soldering in new carbon brushes.

Continue: B04/1 Fig.: B03/2

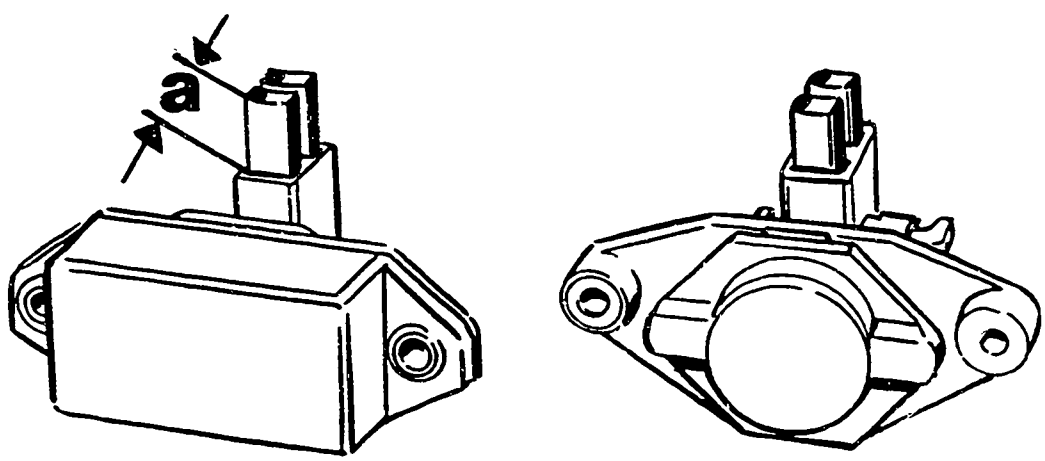


KME 00150

ALTERNATOR DISASSEMBLY

Alternator 0 120 46. ..	Collector-ring diameter (mm)	Carbon-brush project. dimens. "a" (mm) new	min.
with EE-regu.	27.8	14	5.0
0 192 052 ..	32.5	10	5.0
with EL-regu.	27.8	12-13	5.0
1 197 311 ..	32.5	11-12	5.0

Continue: B05/1 Fig.: B04/2



KME 00150

ALTERNATOR DISASSEMBLY

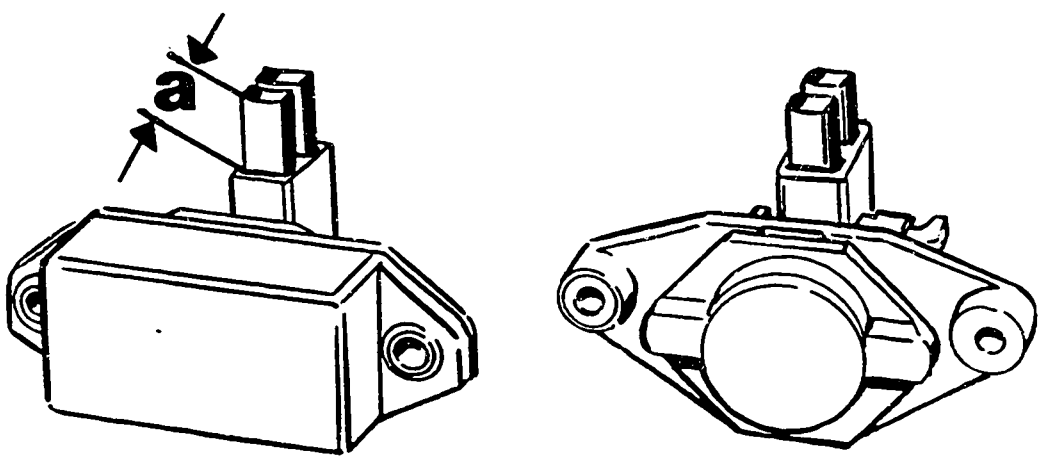
N o t e :

Solder (resin-type tin only) must not be allowed to flow into copper strand.

Silicone sheath over copper strand must be secured next to soldered joint.

Check carbon brushes for freedom of movement following installation.

Continue: B06/1 Fig.: B05/2



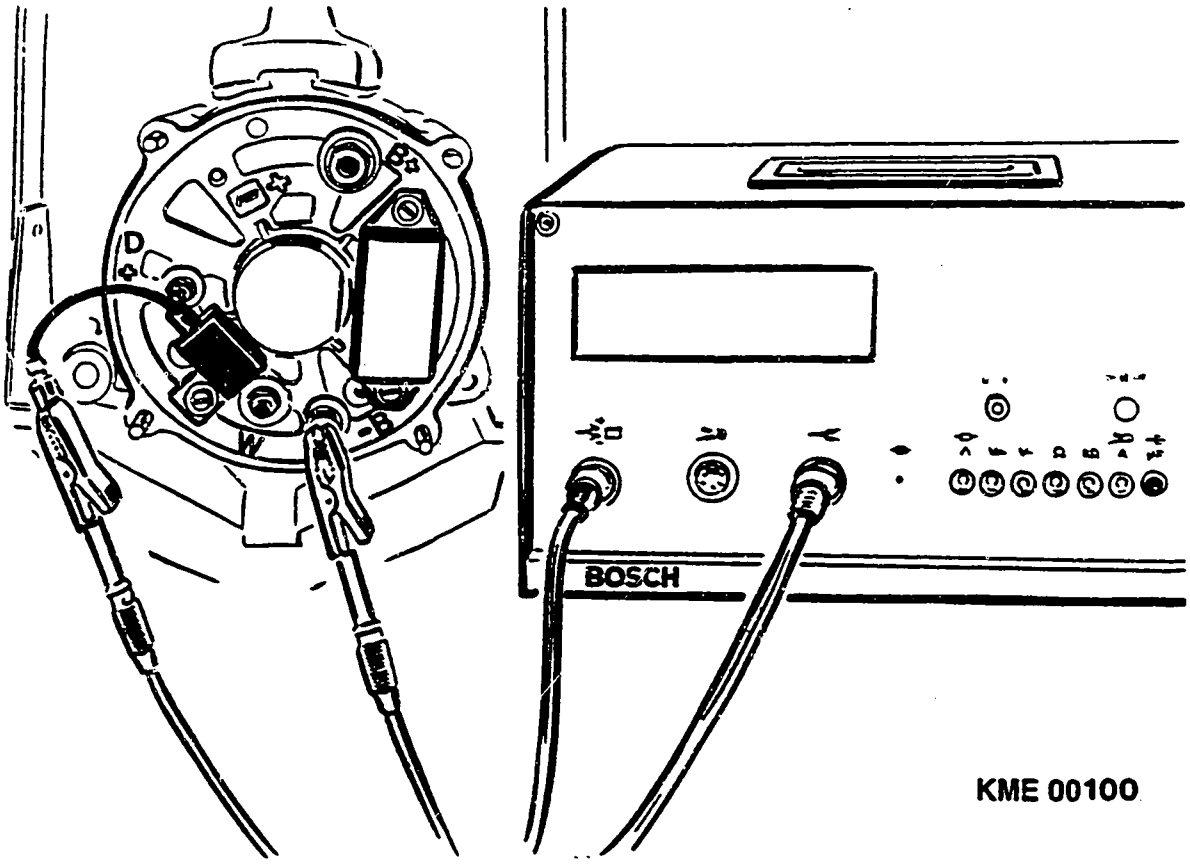
KME 00150

ALTERNATOR DISASSEMBLY
Testing interference-suppression capacitor:

Detach lead of interference-suppression capacitor from B+ plug connection.
Connect electric tester between lead of interference-suppression capacitor and terminal B- of alternator (picture).

Set value: 1,8...2,6 microfarad

Renew defective interference-suppression capacitor if set value is not attained.
After testing, discharge interference-suppression capacitor by means of a short-circuit, so as to prevent cleaning fluid catching fire when cleaning parts.
Continue: B07/1 Fig.: B06/2



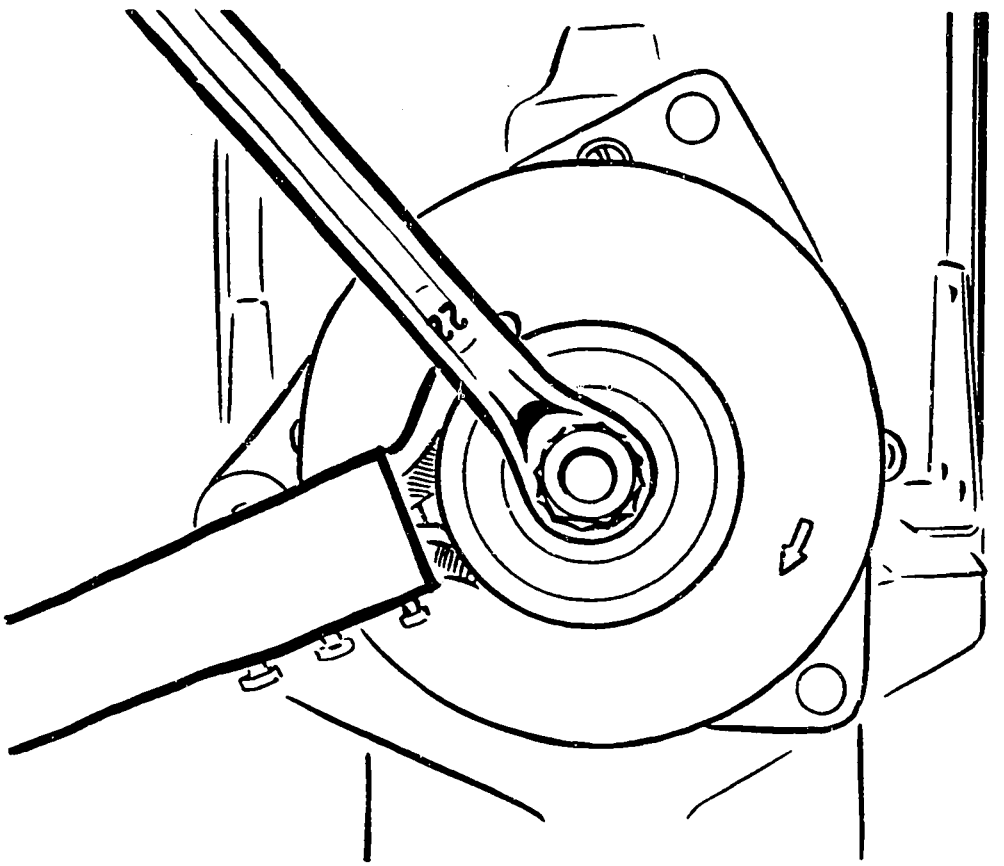
KME 00100

ALTERNATOR DISASSEMBLY

Use securing device KDLI 6006 and box wrench (22 mm) to loosen fastening nut and remove pulley with fan.

In the case of multi-groove pulleys (Poly-V pulley) make use of securing device KDLI 6029 (not illustrated).

Continue: B08/1 Fig.: B07/2



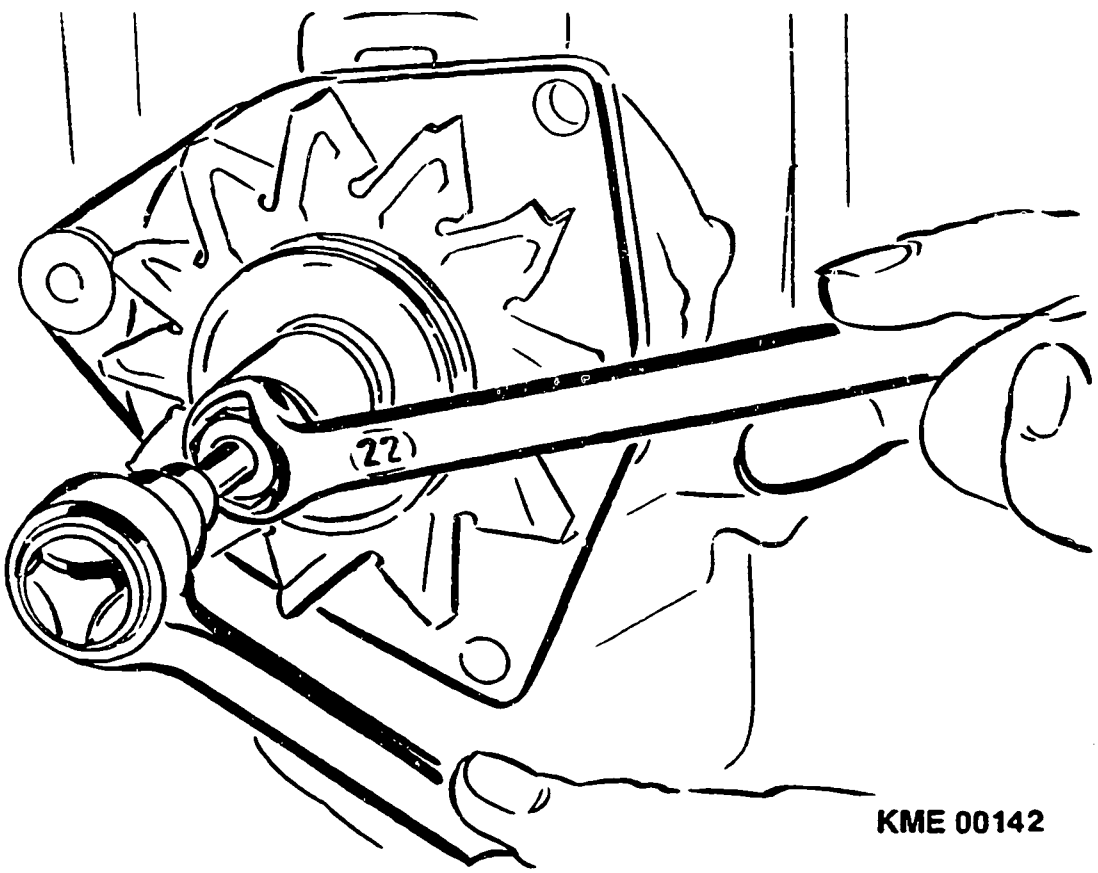
KME 00101

ALTERNATOR DISASSEMBLY

With new alternators, socket wrench KDLI 6030 or KDLJ 6031 (depending on width across flats) is to be attached to fastening nut of pulley.

Hold rotor shaft of alternator with commercially available hexagon-socket-screw key (8 x 120 mm) and loosen nut with box wrench (width across flats 22).

Continue: B09/1 Fig.: B08/2



ALTERNATOR DISASSEMBLY

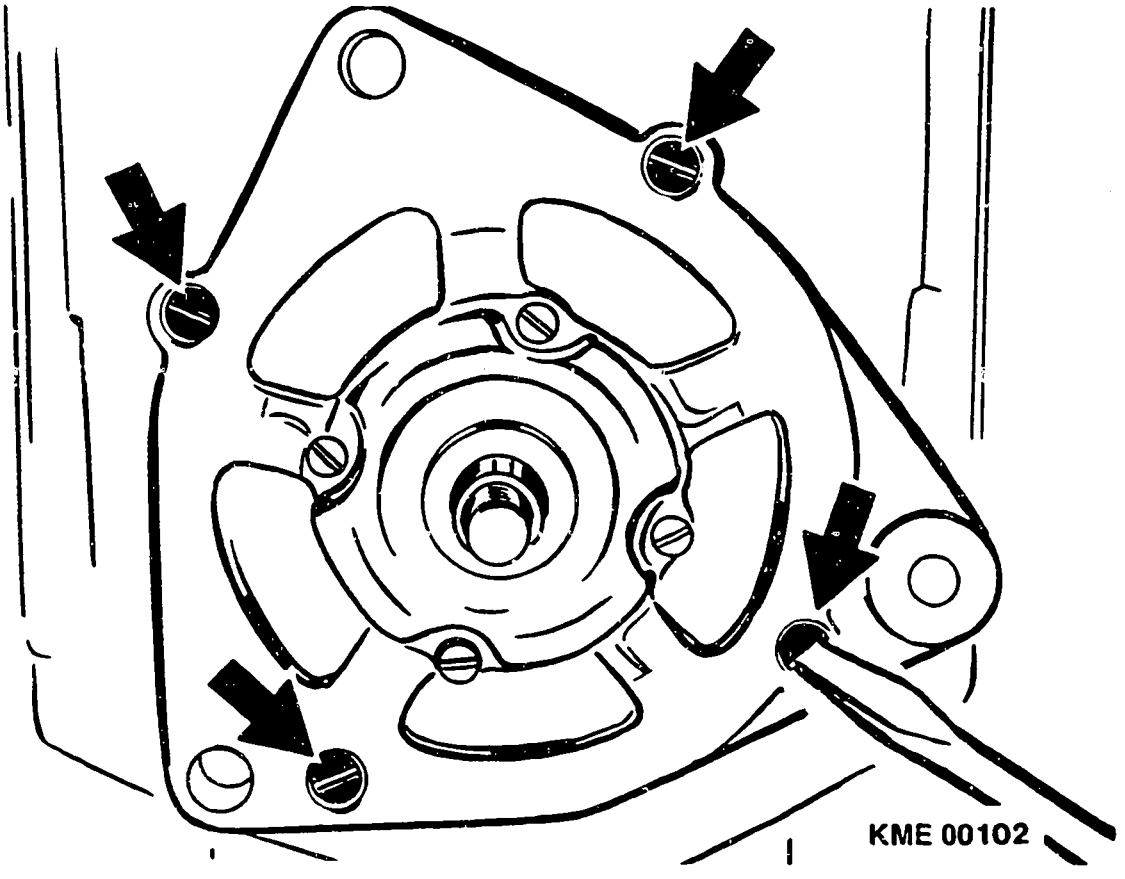
N o t e :

Before proceeding with further disassembly of alternator, mark drive end shield, collector-ring end shield and stator, so as to ensure that these parts assume the same position on reassembly.

Loosen and remove four fillister-head screws (arrows).

Pull drive end shield with rotor out of collector-ring end shield.

Continue: B10/1 Fig.: B09/2



ALTERNATOR DISASSEMBLY

Testing rectifier:

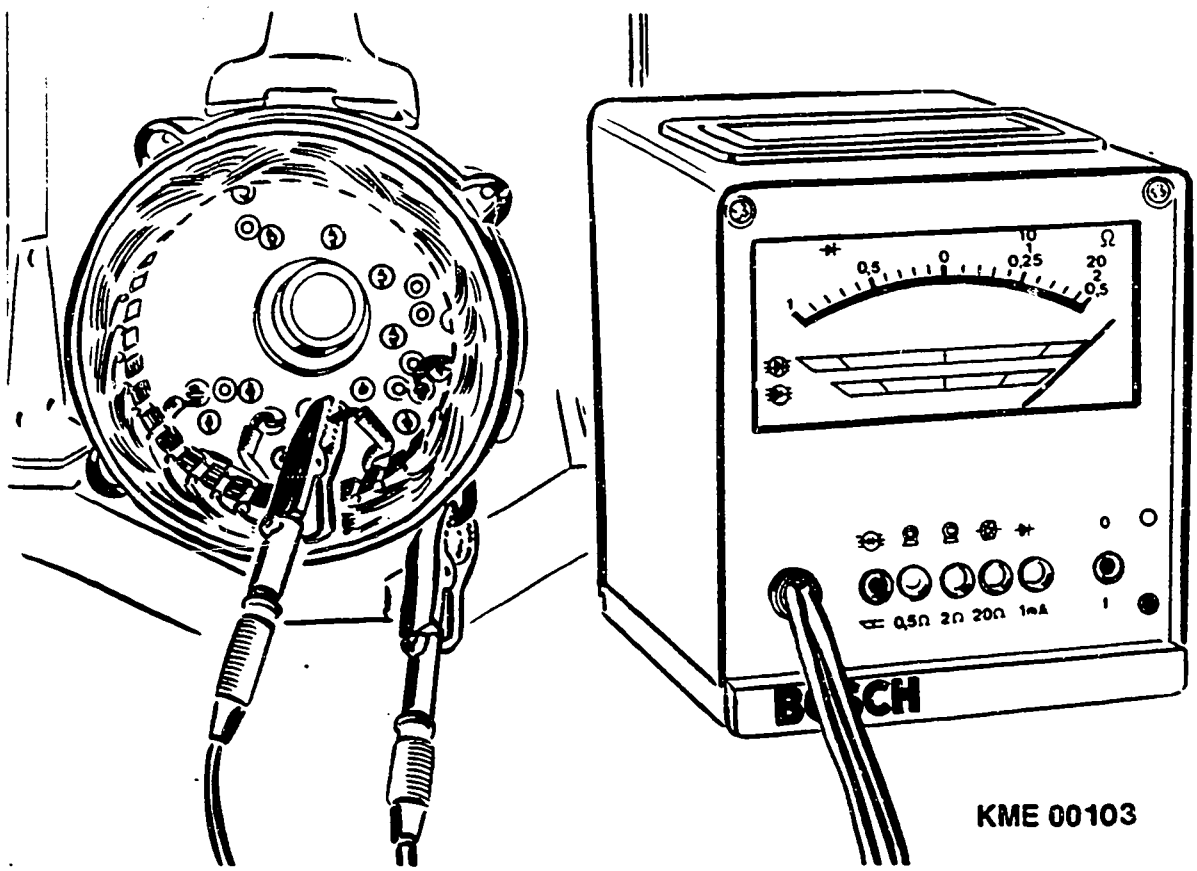
Use EFAW 192 or WPG 012.00 to check function of rectifier whilst it is wired up. Capacitor should not be connected.

Pay attention to switch position on tester.

Measurement points:

Housing and winding ends
B+ and soldered joint, stator connections
D+ and soldered joint,stator connections

Continue: B11/1 Fig.: B10/2



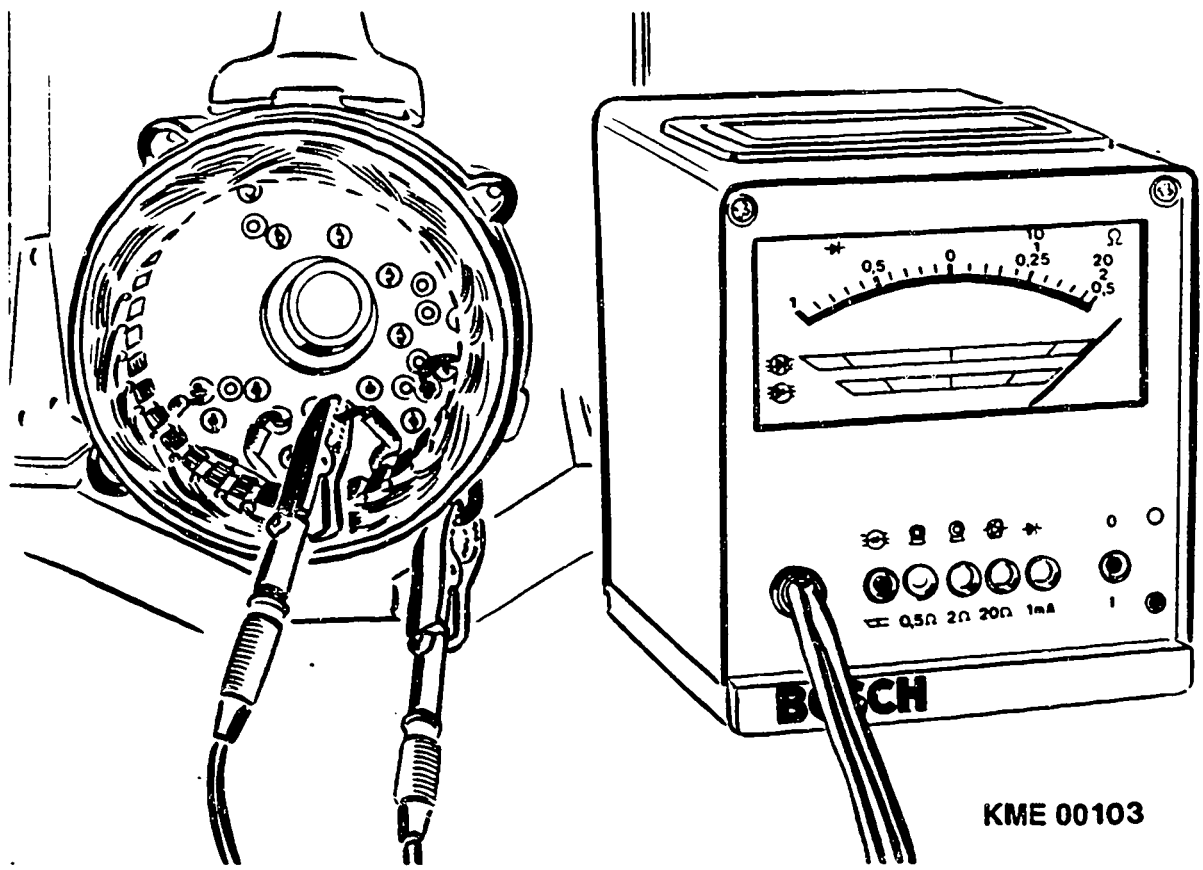
ALTERNATOR DISASSEMBLY

Testing rectifier:

Rectifier is O.K. if pointer of tester is in green zone when performing these measurements.

Renew complete rectifier if one diode or several diodes are defective.

Continue: B12/1 Fig.: B11/2

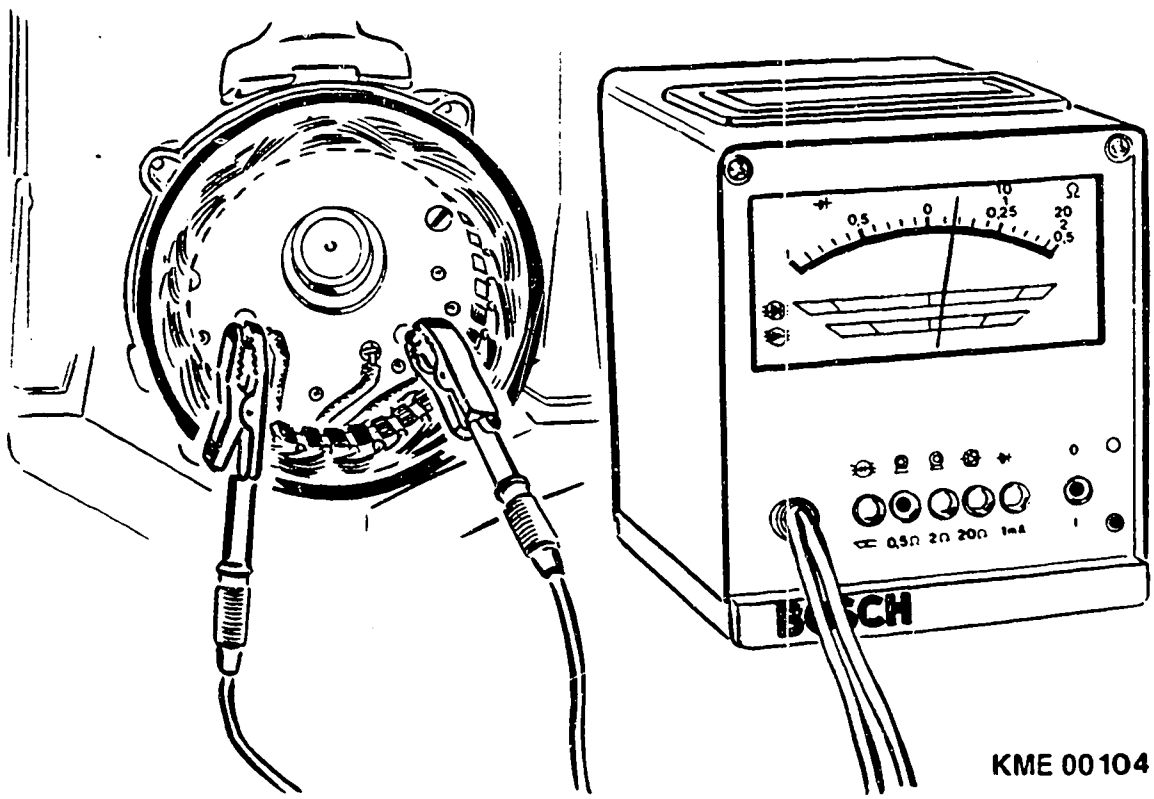


ALTERNATOR DISASSEMBLY
Checking stator (resistance).

Check resistance of stator in in-situ condition (picture). Pay attention to switch position on tester.

Type code	Stator resistance +10%
N1-14V 32/65A	approx. 0.1 ohms
N1-14V 32/70A	approx. 0.1 ohms
N1-14V 31/75A	less than 0.1 ohms
N1-14V 29/80A	less than 0.1 ohms
N1-14V 31/80A	less than 0.1 ohms
N1-14V 36/80A	less than 0.1 ohms
N1-14V 29/90A	less than 0.1 ohms
N1-14V 32/90A	less than 0.1 ohms

Continue: B13/1

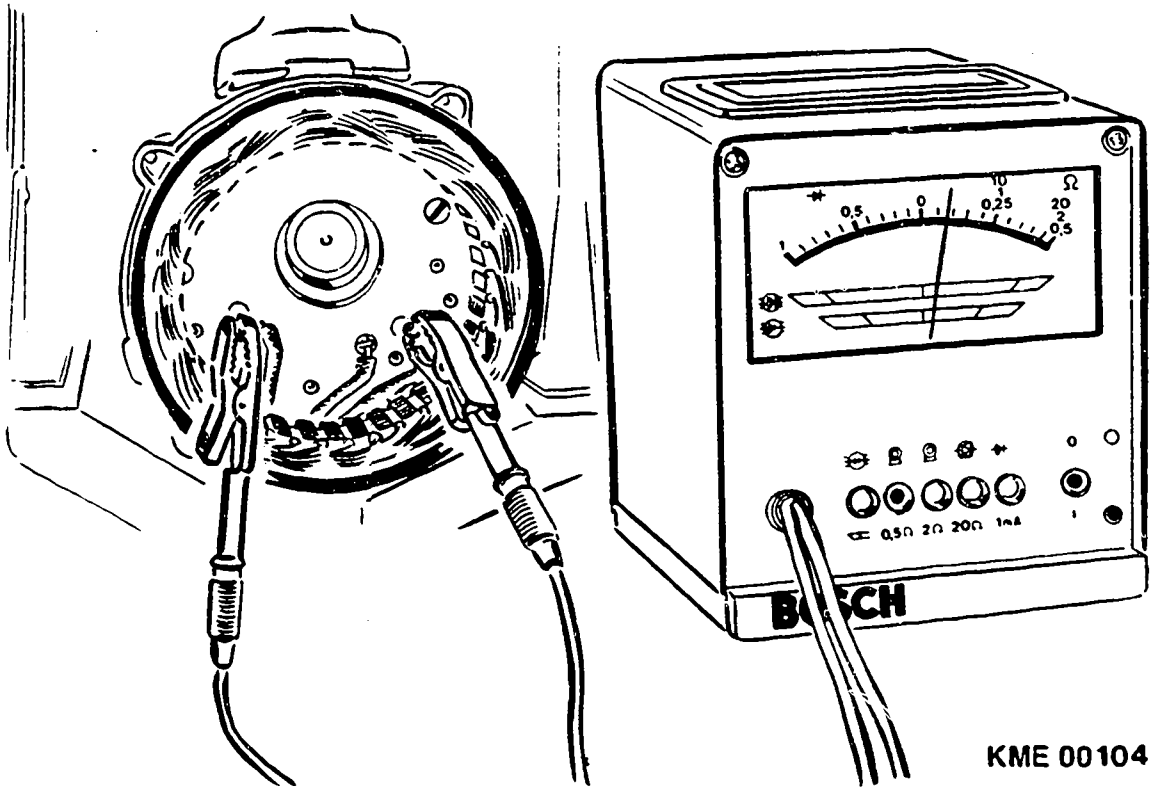


ALTERNATOR DISASSEMBLY
Checking stator (resistance):

Check resistance of stator in in-situ condition (picture).
Pay attention to switch position on tester.

Type code	Stator resistance +10%
N1-14V 34/90A	less than 0.1 ohms
N1-14V 40/90A	less than 0.1 ohms
N1-14V 31/100A	less than 0.1 ohms
N1-14V 36/100A	less than 0.1 ohms
N1-14V 40/100A	less than 0.1 ohms
N1-14V 35/105A	less than 0.1 ohms
N1-14V 35/110A	less than 0.1 ohms
N1-14V 40/110A	less than 0.1 ohms

Continue: B14/1 Fig.: B13/2



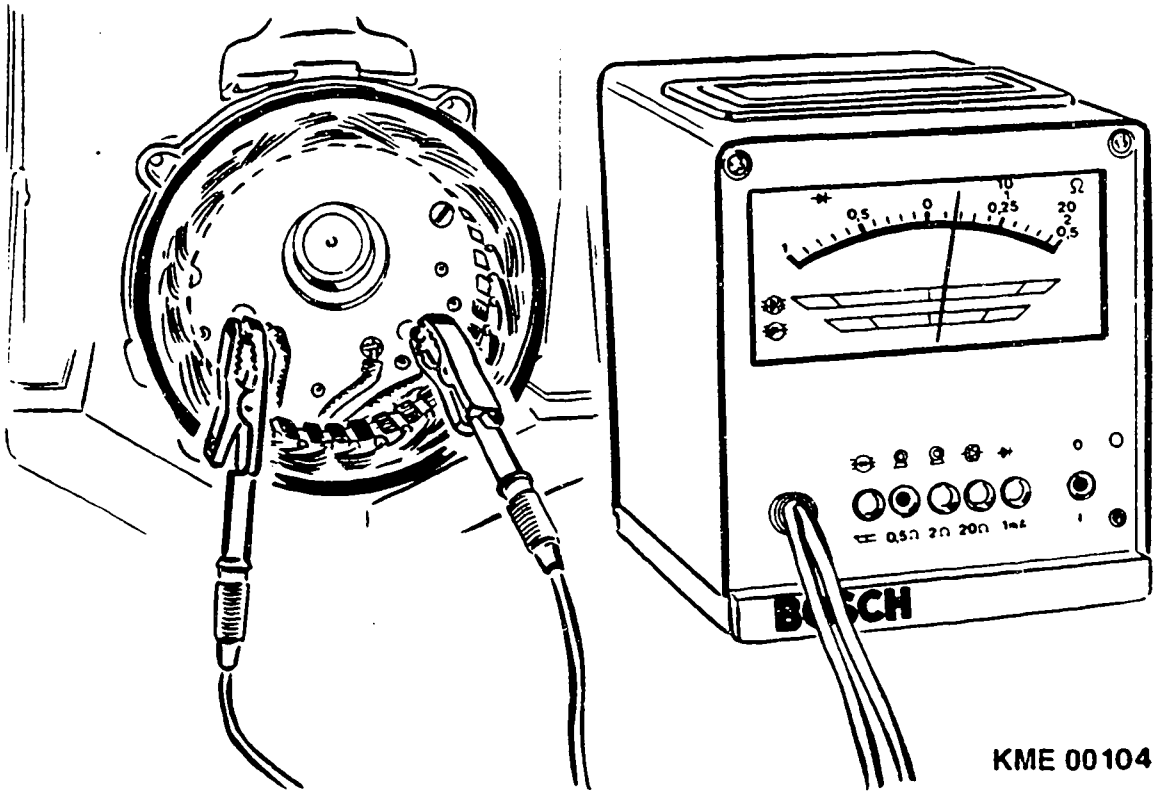
ALTERNATOR DISASSEMBLY
Checking stator (resistance):

Check resistance of stator in in-situ condition (picture).
Pay attention to switch position on tester.

Type code	Stator resistance +10%
N1-14V 10/115A	less than 0.1 ohms
N1-14V 35/115A	less than 0.1 ohms
N1-14V 40/115A	less than 0.1 ohms
N1-14V 25/135A	less than 0.1 ohms
N1-14V 25/140A	less than 0.1 ohms

Repeat test following removal (not illustrated).

Continue: B15/1 Fig.: B14/2



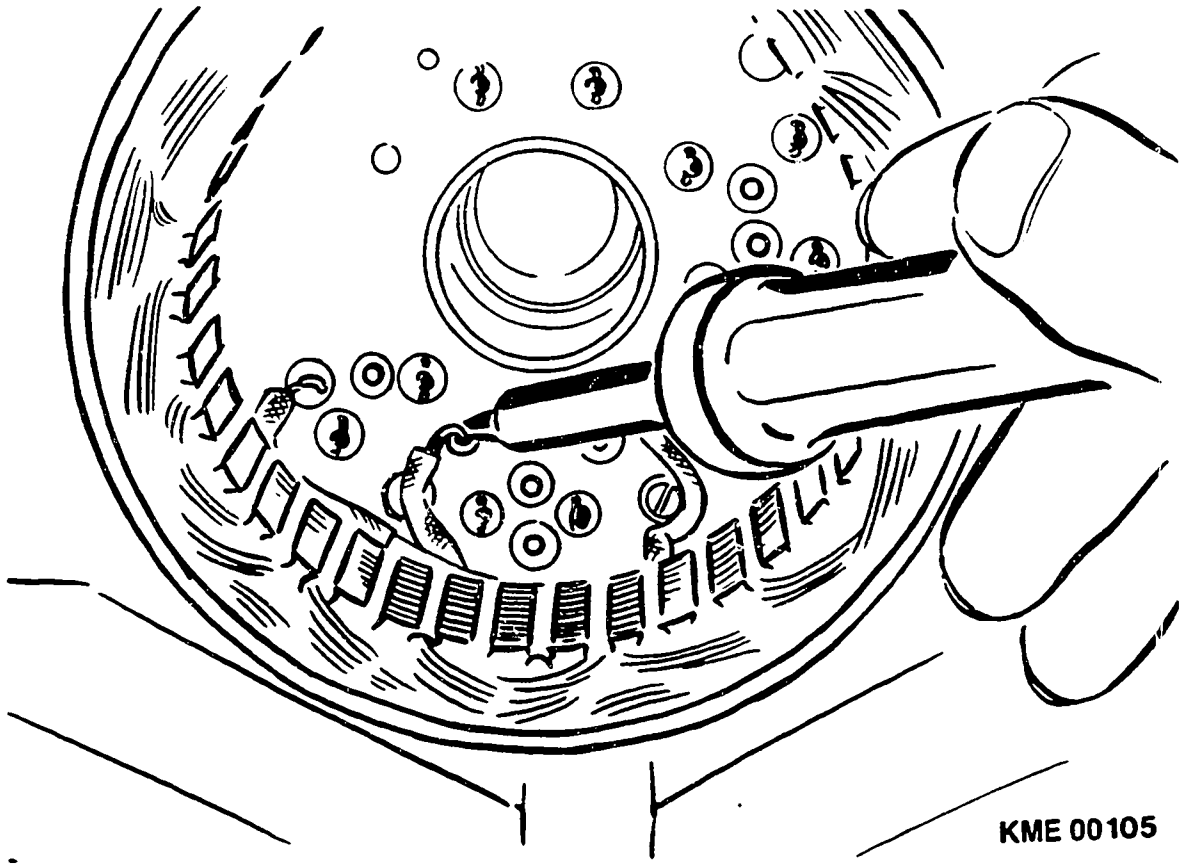
ALTERNATOR DISASSEMBLY

Stator removal

Remove soldering tin from phase connections with soldering iron or solder gun.

Bend open bent-around lead connections with screwdriver or pliers and pull leads out of fastening lugs.

Continue: B16/1 Fig.: B15/2



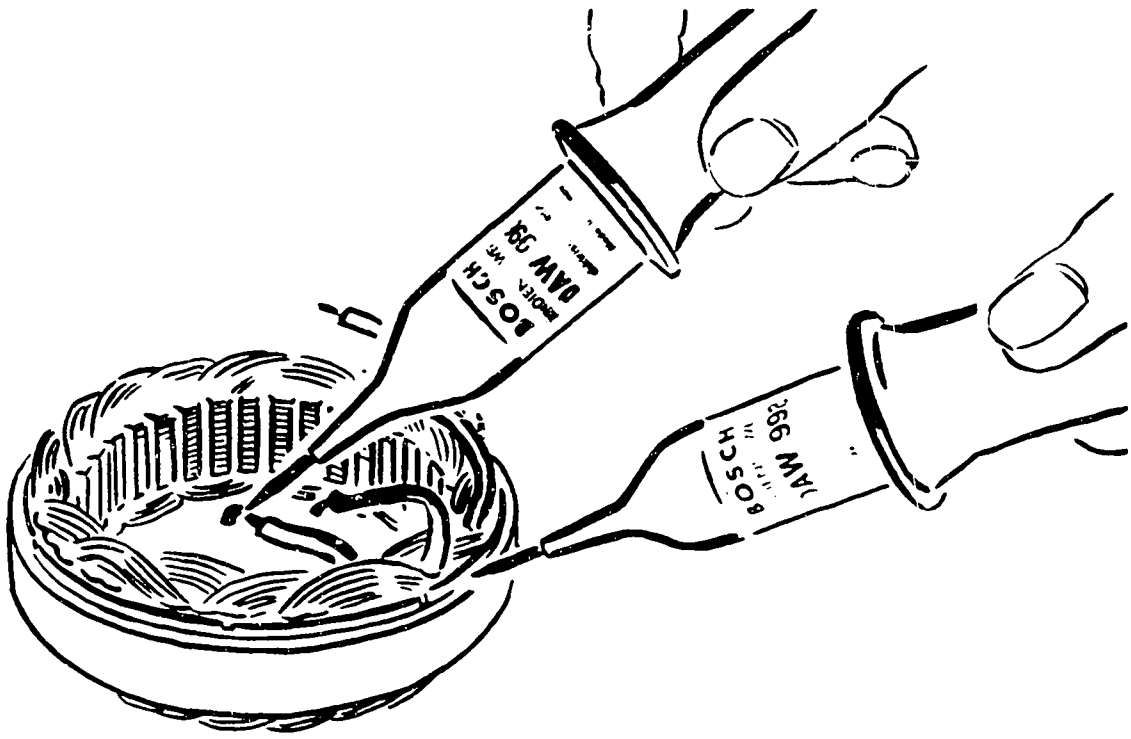
ALTERNATOR DISASSEMBLY

Checking stator (short to ground):

Use test prods EFAW 84 or KDAW 9983 to check stator for short to ground.

Test voltage: 80 VAC

Continue: B17/1 Fig.: B16/2



KME 00106

ALTERNATOR DISASSEMBLY

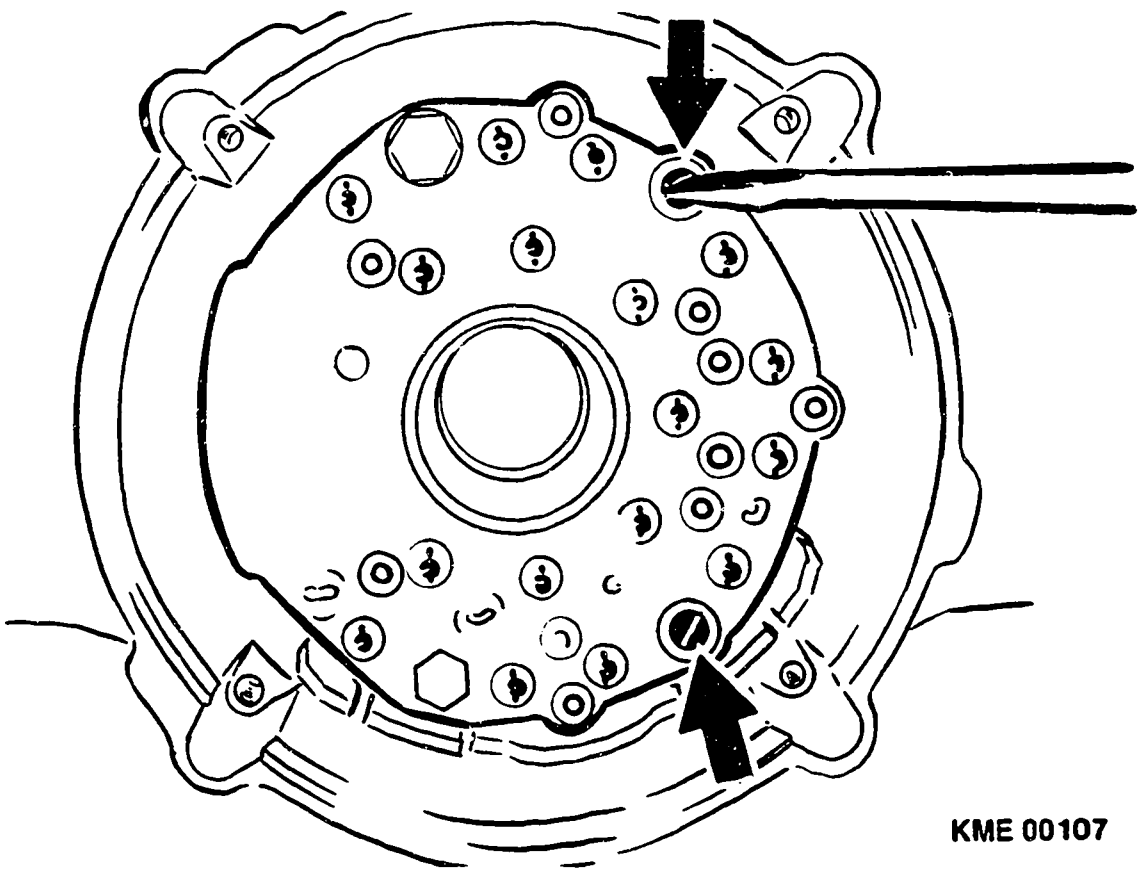
Removing rectifier:

Remove 2/3 combi-screws on inside of rectifier (picture).

Loosen terminal studs B+, B-(if applicable), W and D+ on outside of collector-ring end shield.
They are permanently installed on rectifier.

Remove rectifier from collector-ring end shield.

Continue: B18/1 Fig.: B17/2



KME 00107

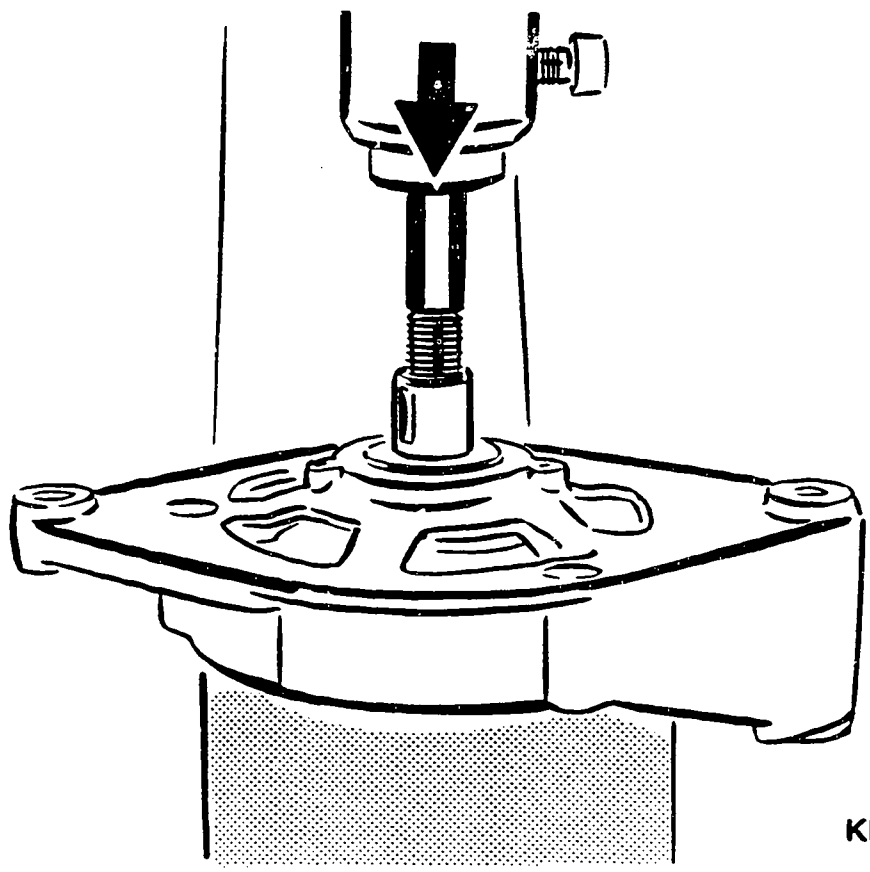
ALTERNATOR DISASSEMBLY

Removing rotor:

Rotor only has to be removed if collector rings or excitation winding is/are defective, or if same applies to deep-groove ball bearing/collector-ring end shield.

Press out rotor under mandrel press if holding plate of deep-groove ball bearing is bolted from inside of alternator. To do so, use old stator frame (e.g. of starting motor) with 105 mm inside diameter and 115 mm outside diameter (see picture).

Continue: B19/1 Fig.: B18/2



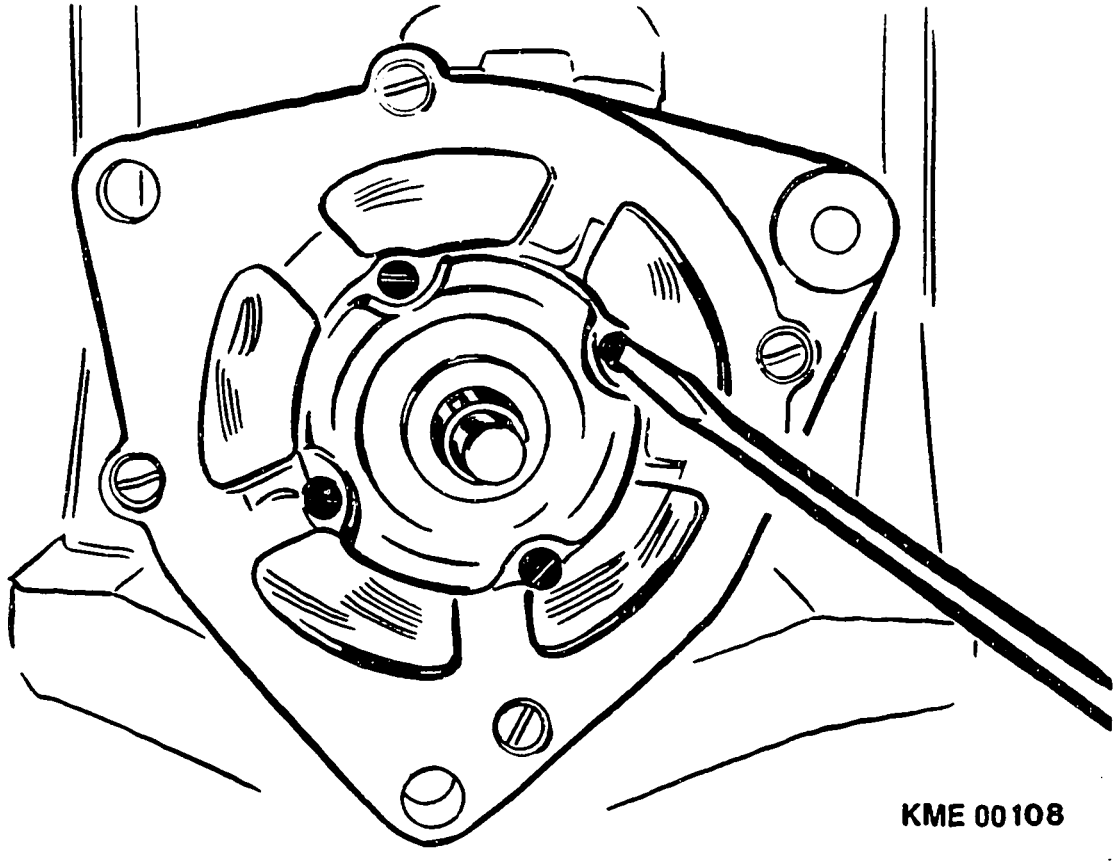
KME 00127

ALTERNATOR DISASSEMBLY

Removing rotor (continued):

Rotor only has to be removed if collector rings, excitation winding, deep-groove ball bearing or collector-ring end shield is defective.
Clamp rotor in position in clamping support if holding plate of deep-groove ball bearing is bolted from outside.
Use commercially available puller to pull off deep-groove ball bearing with cover plate.
Loosen and remove 4 fastening screws (see picture). Pull deep-groove ball bearing with rotor out of end shield (sliding fit).

Continue: B20/1 Fig.: B19/2



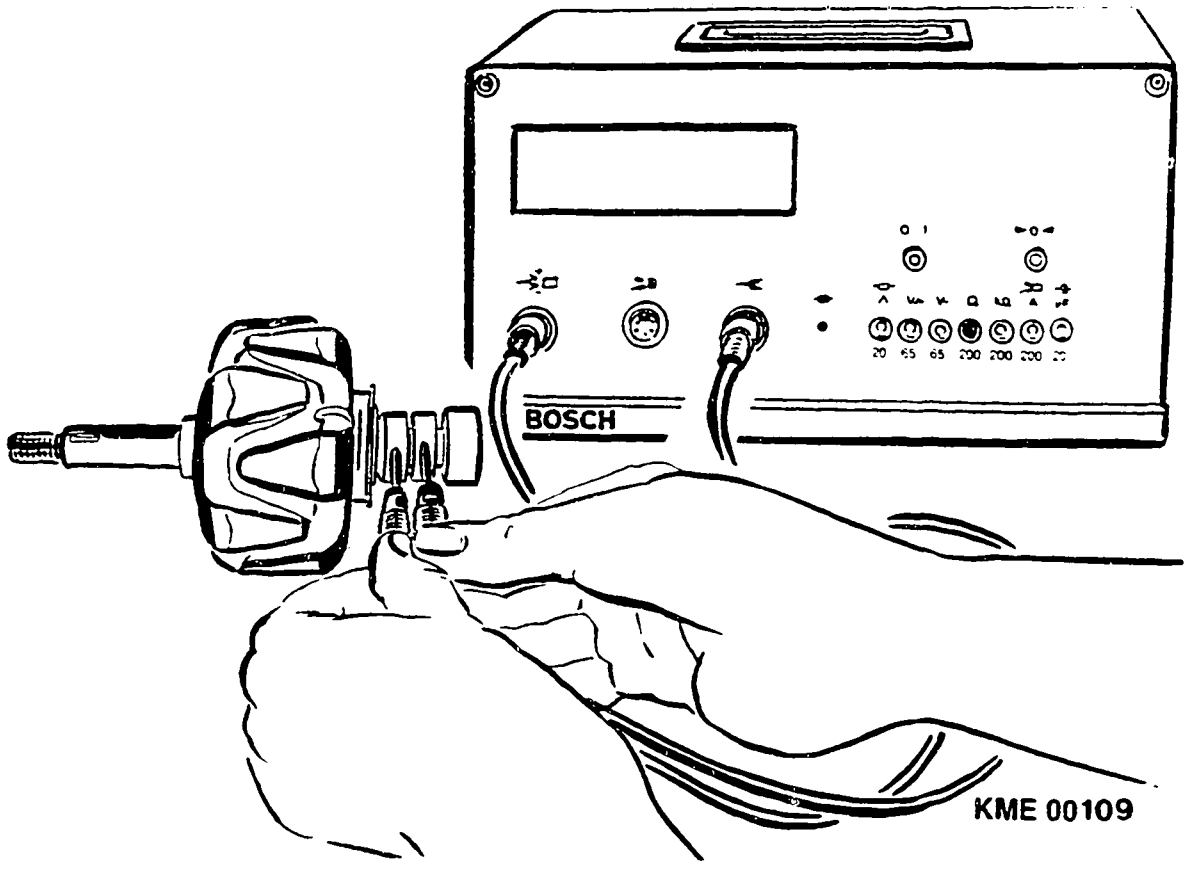
KME 00108

ALTERNATOR DISASSEMBLY

Checking rotor resistance:
Use electric tester ETE 014.00 to measure rotor resistance (see picture).
Resistance values with alternator:

Type N1 () 14V	Rotor ohms + 10% up to date manuf. 152	as of date manuf. 241
32 / 65 A	3.4	2.9
32 / 70 A	2.9	—
31 / 75 A	3.4	2.9
29 / 80 A	3.4	2.9
31 / 80 A	—	2.6
36 / 80 A	3.4	2.6
29 / 90 A	3.4	2.6

Continue: B21/1 Fig.: B20/2

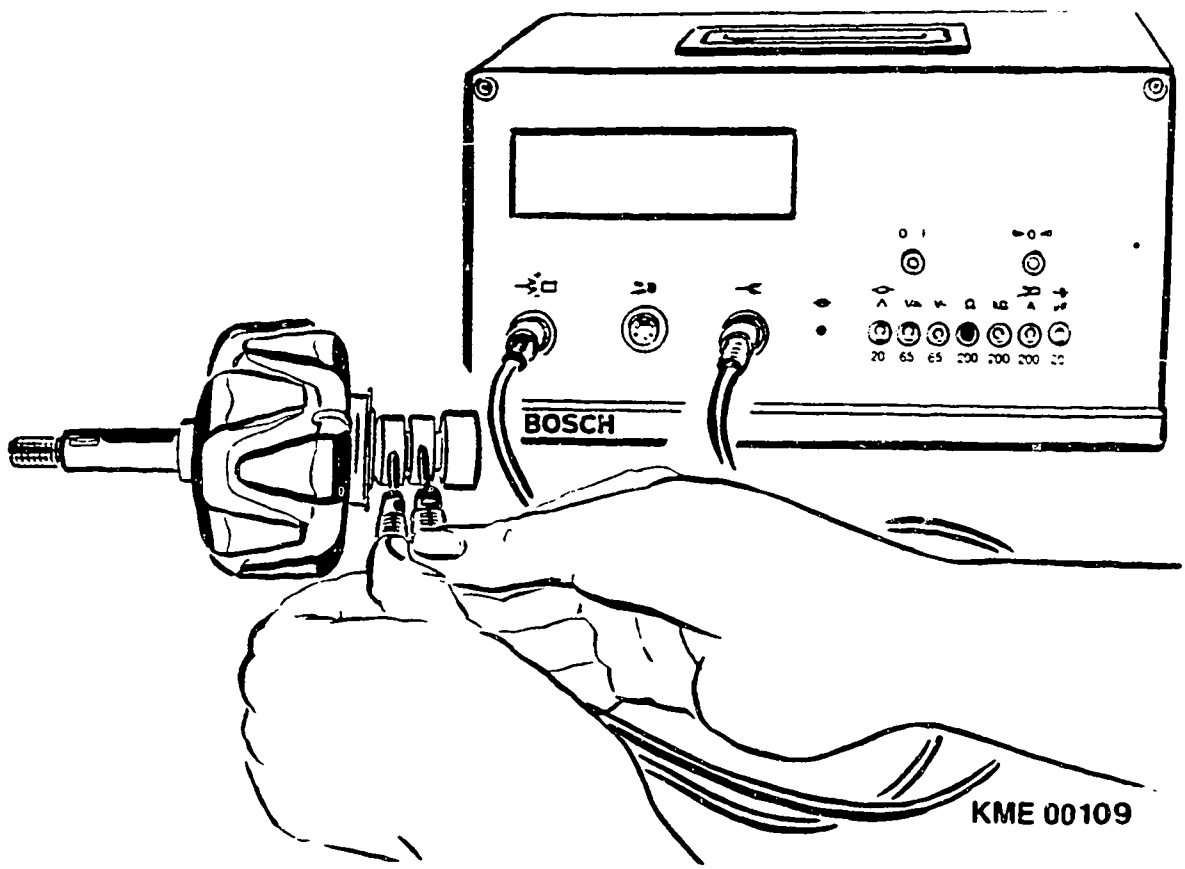


ALTERNATOR DISASSEMBLY

Checking rotor resistance:

Type N1 () 14V	Rotor ohms + 10%
32 / 90 A	2.6
34 / 90 A	2.6
40 / 90 A	1.8
31 / 100 A	2.6
36 / 100 A	2.6
40 / 100 A	2.6
35 / 105 A	2.6

Continue: B22/1 Fig.: B21/2

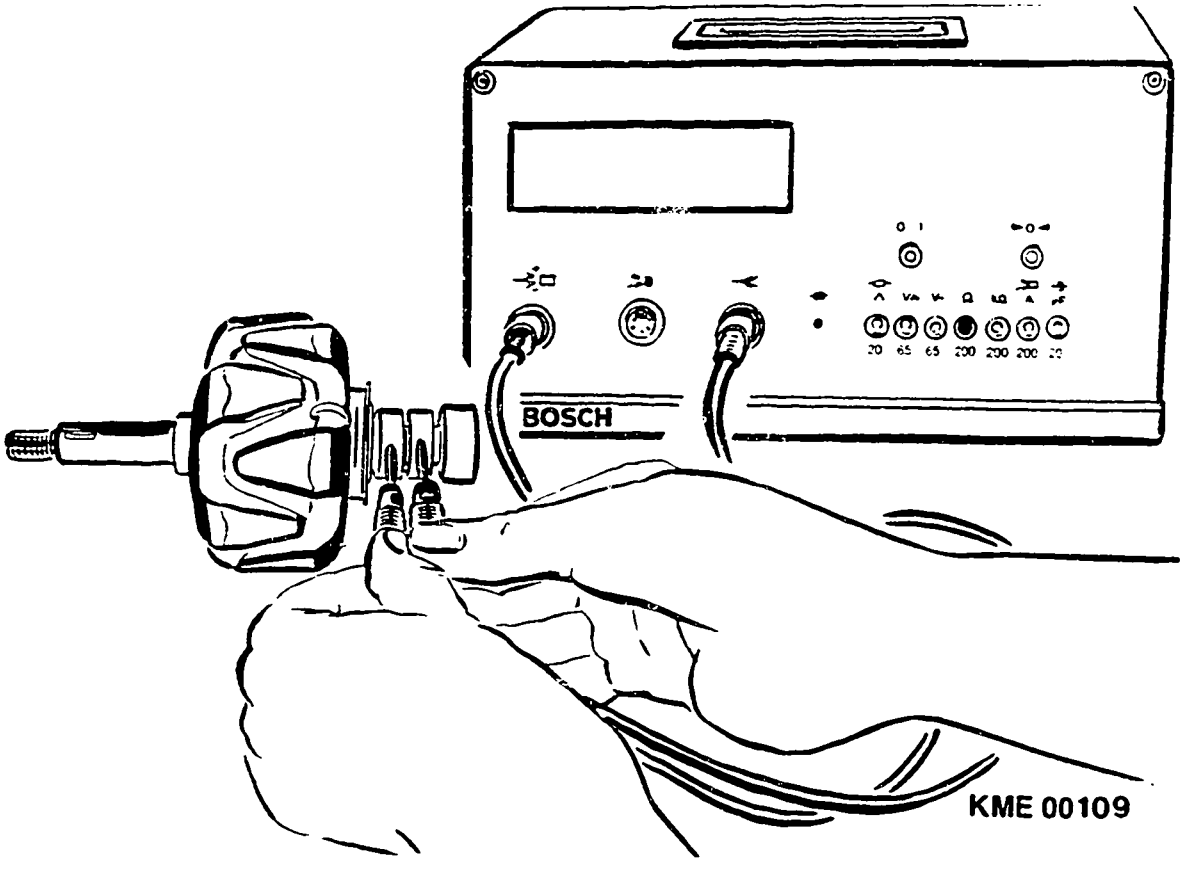


ALTERNATOR DISASSEMBLY

Checking rotor resistance:

Type N1 () 14V	Rotor ohms + 10%
35 / 110 A	2.6
40 / 110 A	2.6
10 / 115 A	2.6
35 / 115 A	2.6
40 / 115 A	2.6
25 / 135 A	2.6
25 / 140 A	2.6

Continue: B23/1 Fig.: B22/2



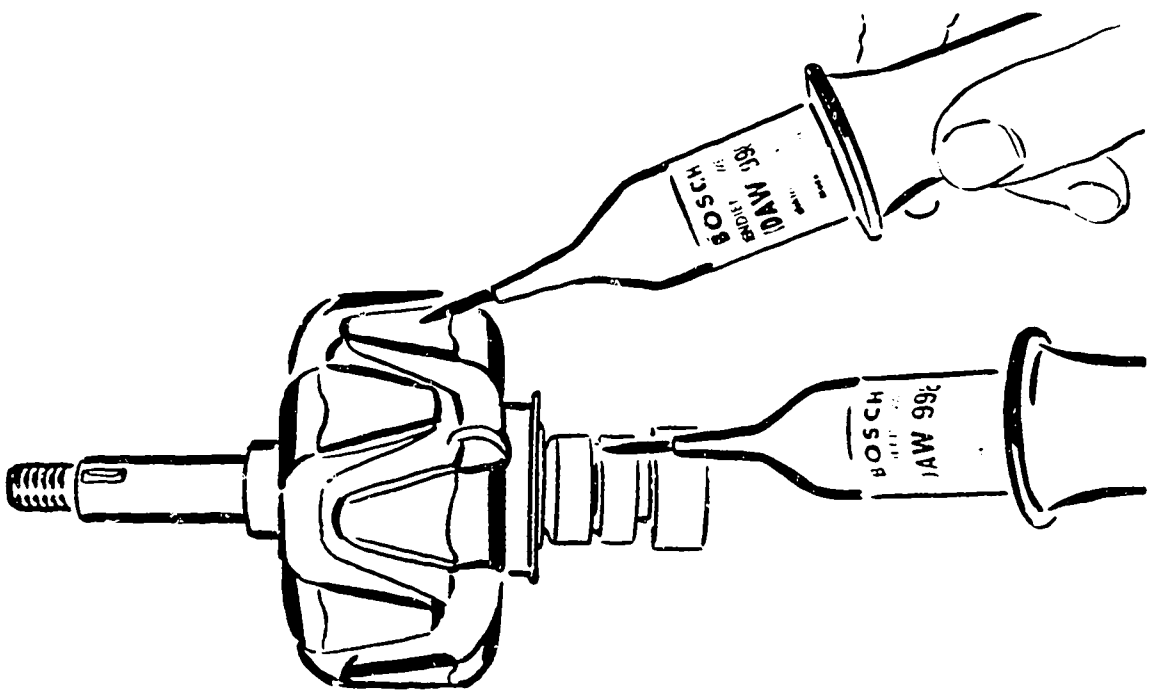
ALTERNATOR DISASSEMBLY

Checking rotor for short to ground:

Use test prods EFAW 84 or KDAW 9983
to check rotor for short to ground.

Test voltage: 80 VAC.

Continue: B24/1 Fig.: B23/2

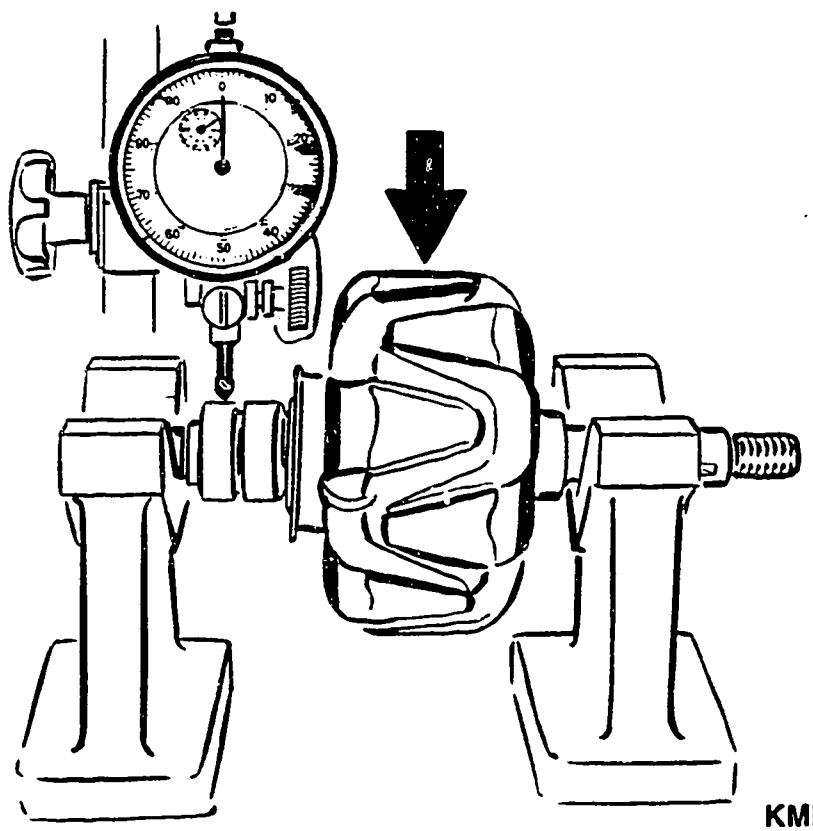


KME 00110

ALTERNATOR DISASSEMBLY

Concentricity measurement:
Support rotor at bearing points in prisms and align so as to be exactly horizontal. Carry out concentricity measurement at outside diameter of rotor (arrow) and at outside diameter of collector rings (see picture) with magnetic stand T-M 1 (4 851 601 124) and dial gauge EFAW 7. Maximum deviation at rotor 0.05 mm. Maximum deviation at collector rings 0.03 mm. Turn down collector rings in the event of greater deviation.
Minimum diameter of collector rings:
new 27.8 mm – min. dimens. 26.8 mm
or new 32.5 mm – min. dimens. 31.5 mm

Continue: B25/1 Fig.: B24/2



KME 00111

ALTERNATOR DISASSEMBLY

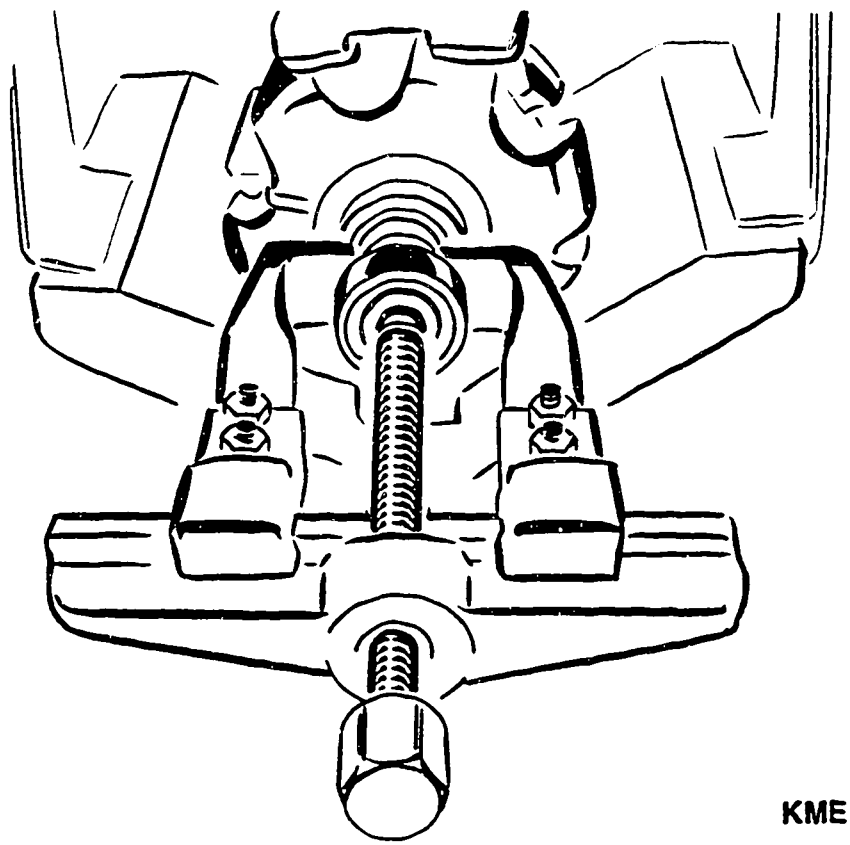
Removing collector rings:

Use commercially available puller to pull off deep-groove ball bearing (see picture).

Unsolder leads of excitation winding from collector rings.

Use commercially available extractor to pull collector rings off rotor shaft (not illustrated).

Continue: B26/1 Fig.: B25/2



KME 00112

CLEANING OF PARTS

C A U T I O N !
D A N G E R O F F I R E

To provide interference suppression for receivers and transmitters, alternators are fitted with capacitors with a long storage time.

Washing out alternator components may result in capacitor discharge when immersing them in cleaning fluids. This can cause combustible liquids to catch fire.

Continue: B26/2

CLEANING OF PARTS

For this reason, parts featuring capacitors are only to be washed out in HAKU 1025/6.

Continue: B27/1

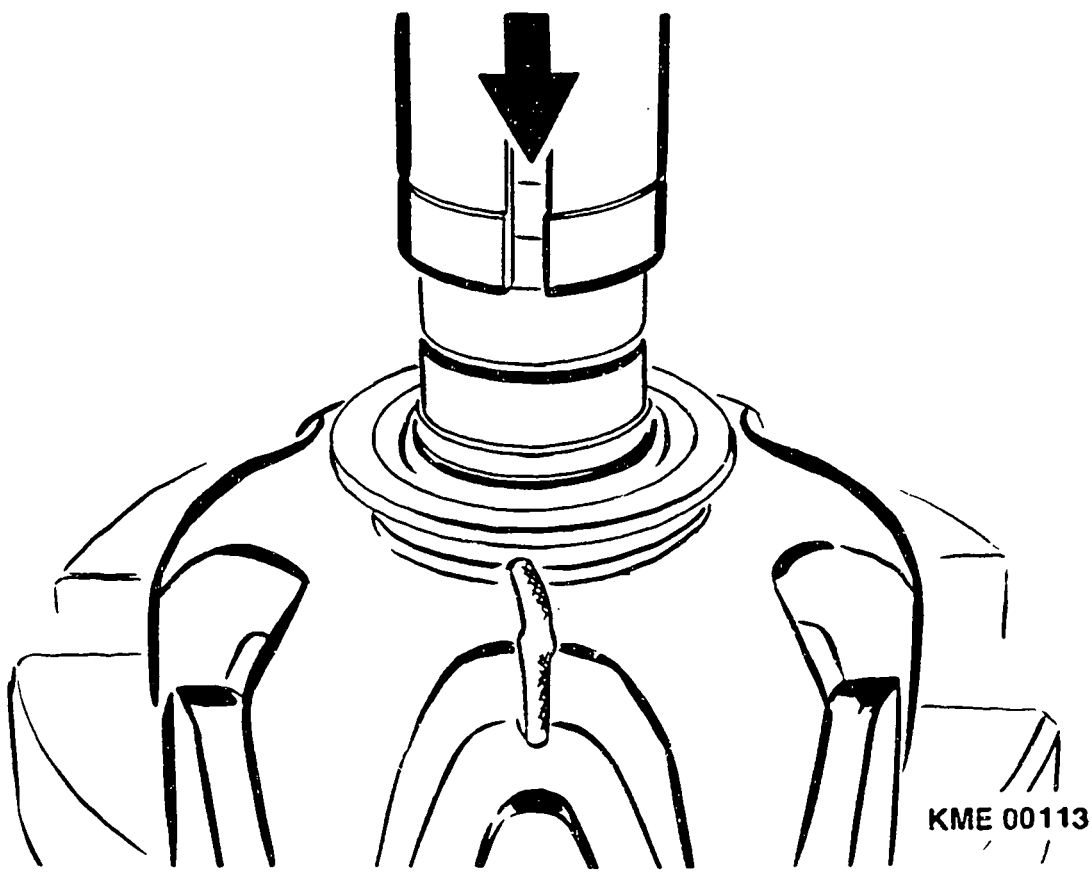
ALTERNATOR ASSEMBLY

Pressing on collector rings:

Place collector rings in position on rotor shaft. Insert one lead of exciter winding into slot in collector rings. Press home collector rings with pressing-in tools KDLI 6004/1 and 6004/0/1. In doing so, position groove in pressing-on tool such that lead of exciter winding, which is routed through the collector rings, is visible.

Solder on exciter-winding wires. Dress solder joint at both collector rings such that collector rings no longer reveal any unevenness. Check cementing of connection wires.

Continue: B28/1 Fig.: B27/2



ALTERNATOR ASSEMBLY

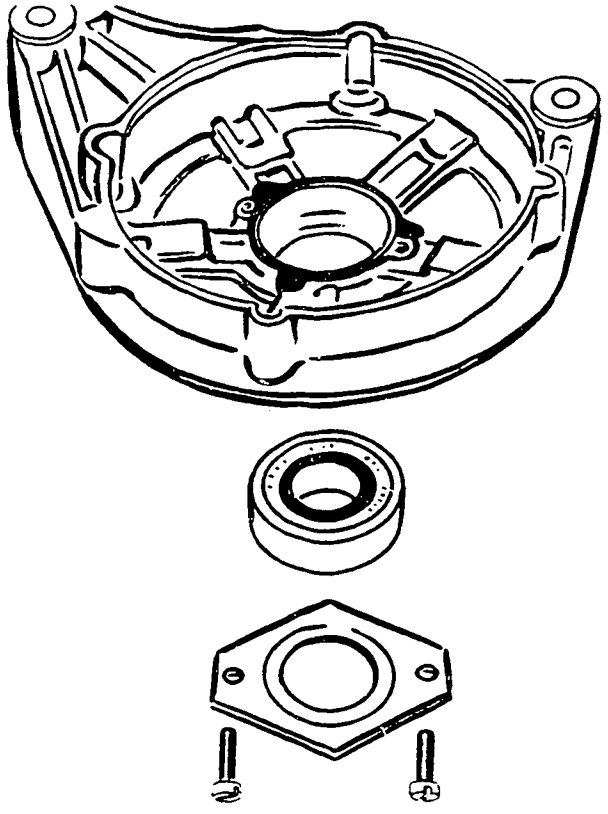
Drive-end-shield assembly if holding plate bolted from outside:

Insert n e w deep-groove ball bearing in drive end shield.

Place n e w holding plate in position and secure with 2 screws (see picture), ensuring that hole in holding plate is in alignment with hole in deep-groove ball bearing.

Tightening torque: 2.4 ... 2.9 Nm.

Continue: C01/1 Fig.: B28/2



KME 00119

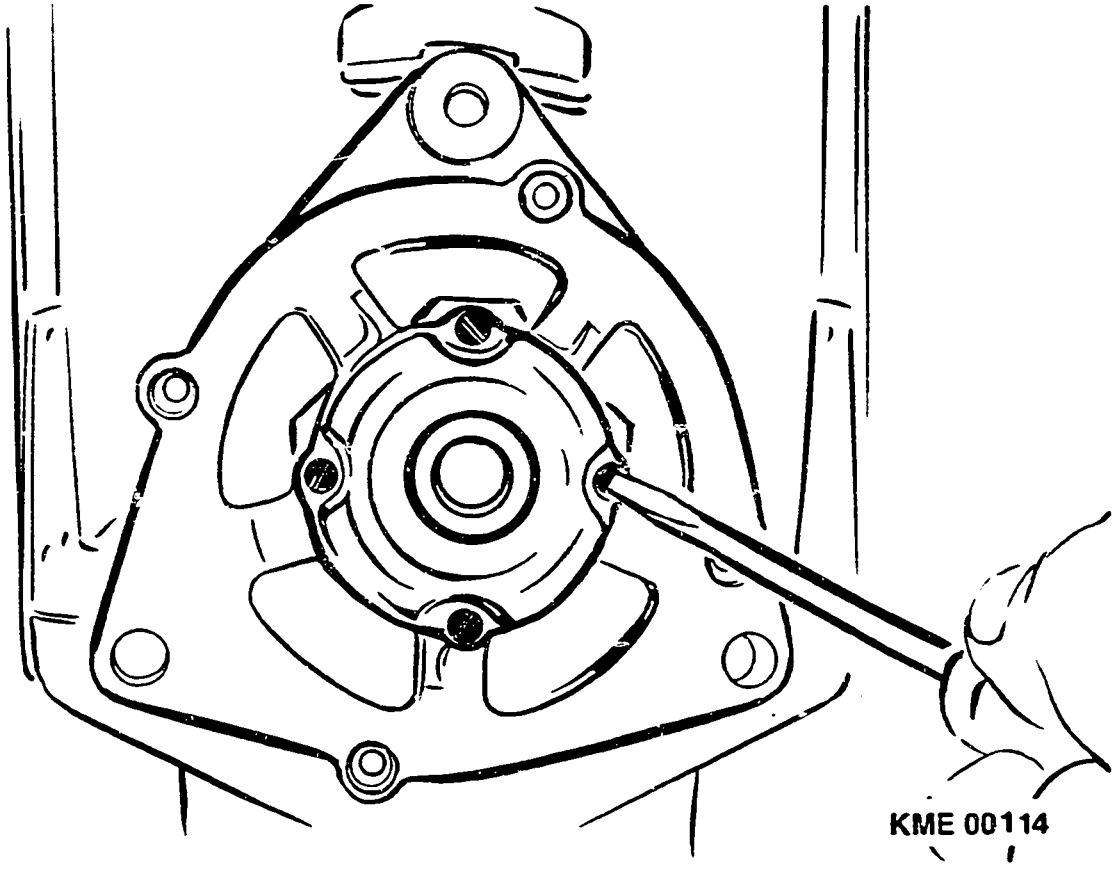
ALTERNATOR ASSEMBLY

Drive-end-shield assembly if holding plate bolted from outside:

Insert n e w deep-groove ball bearing in drive end shield.

Place n e w holding plate in position and secure with 4 screws (see picture) to be tightened alternately with tightening torque: 2.4 ... 2.9 Nm.

Continue: C02/1 Fig.: C01/2

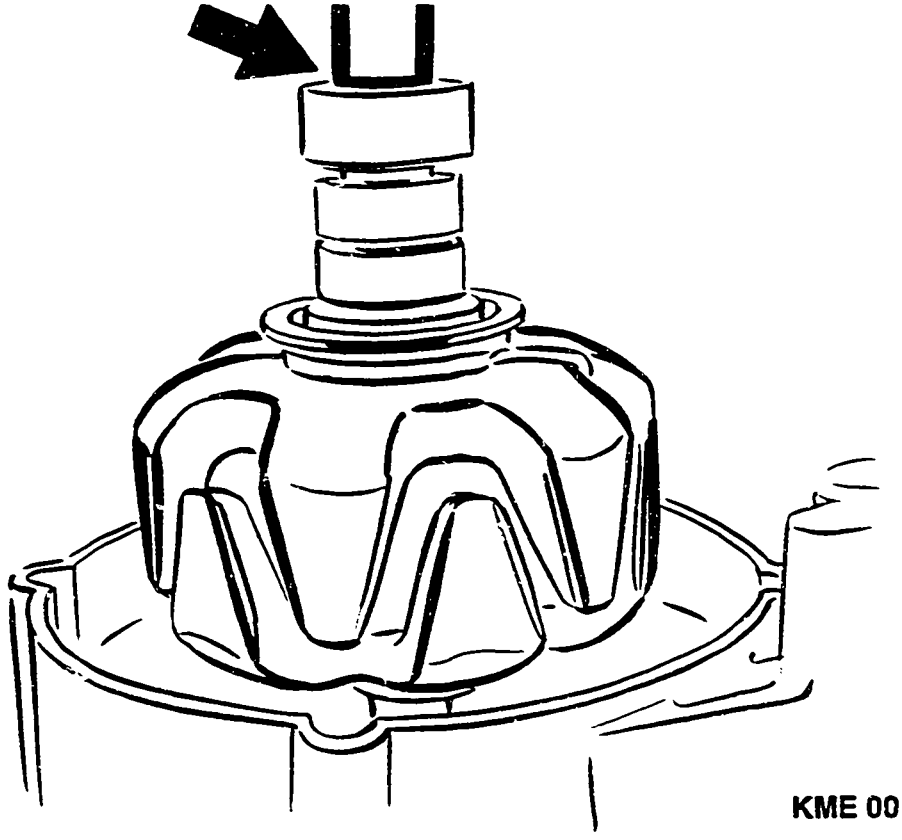


ALTERNATOR ASSEMBLY

Pressing rotor into drive end shield:

Insert spacer ring in drive end shield on fan end with narrow collar facing deep-groove ball bearing. Place drive end shield with spacer ring on suitable base such that pressure is not exerted on the drive end shield when pressing in rotor.
Insert rotor into deep-groove ball bearing (see picture). Attach new deep-groove ball bearing (arrow) on collector-ring end to rotor shaft.
Use pressing-in mandrel KDLI 6002 to press deep-groove ball bearing and rotor into drive end shield as far as they will go.

Continue: C03/1



KME 00115

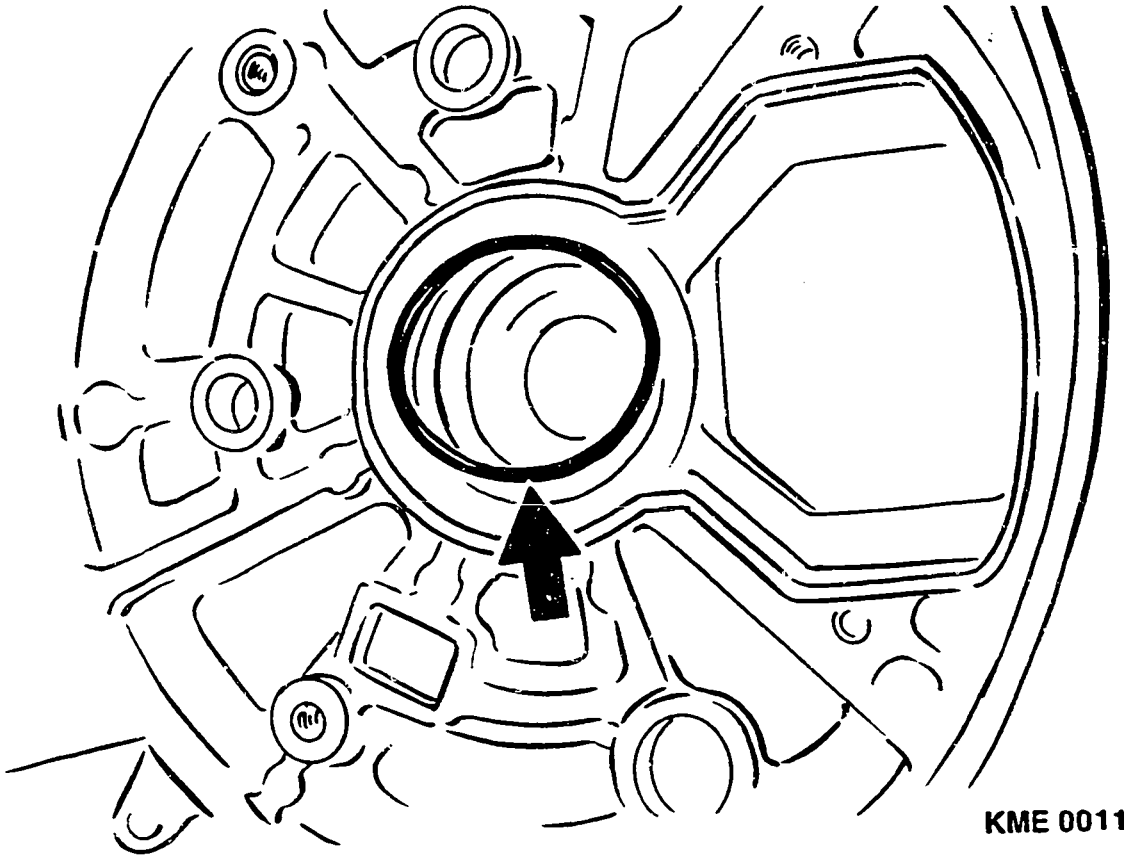
ALTERNATOR ASSEMBLY

Replacing O-ring:

Examine O-ring in collector-ring end shield for damage.

Replace with new O-ring if necessary.

Continue: C04/1 Fig.: C03/2



KME 00116

ALTERNATOR ASSEMBLY

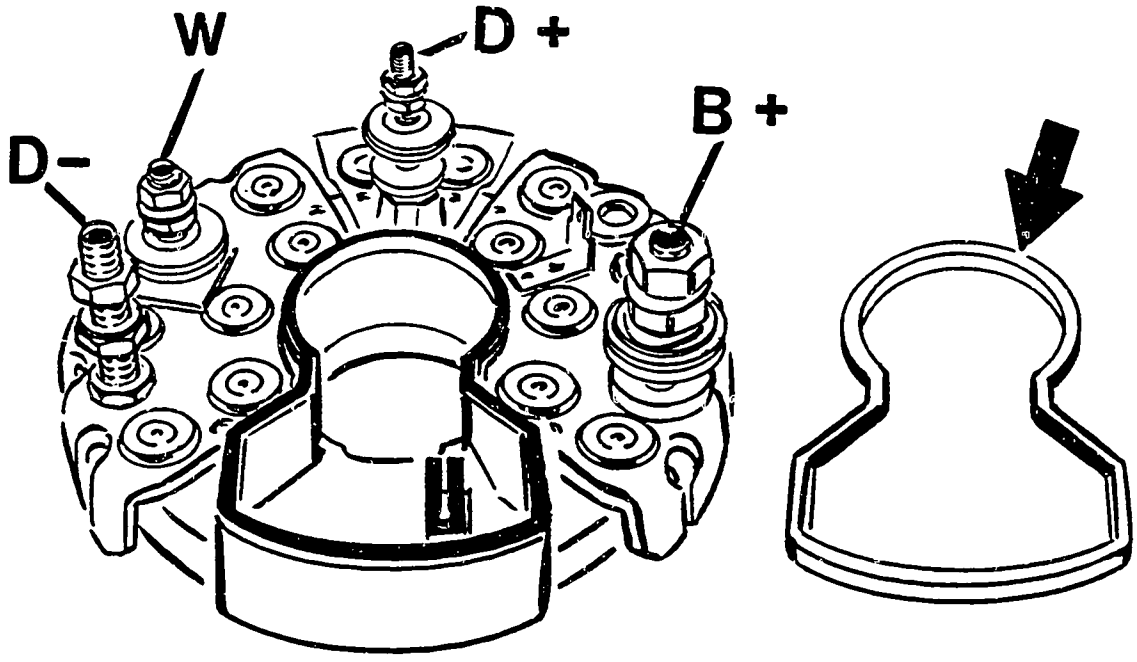
Installing rectifier:

Place seal (see picture, arrow) on keyhole of rectifier and secure all-round with adhesive dispersion 5 703 151 000.

Insert washer and insulating bushing over B+ and D+ connection.

Insert rectifier into collector-ring end shield.

Continue: C05/1 Fig.: C04/2



KME 00117

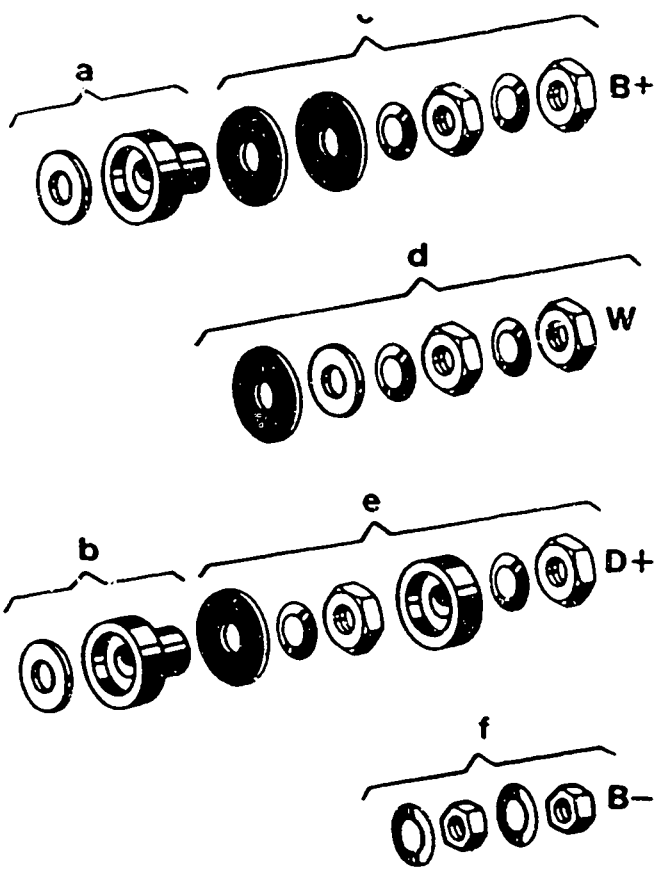
ALTERNATOR ASSEMBLY

Attach rectifier on connection end to parts c, d, e and f:

Tightening torques:

Part c = 7.5...8.0 Nm
Part d = 2.7...3.8 Nm
Part e = 1.4...2.0 Nm
Part f = 4.8...6.8 Nm

Continue: C06/1 Fig.: C05/2



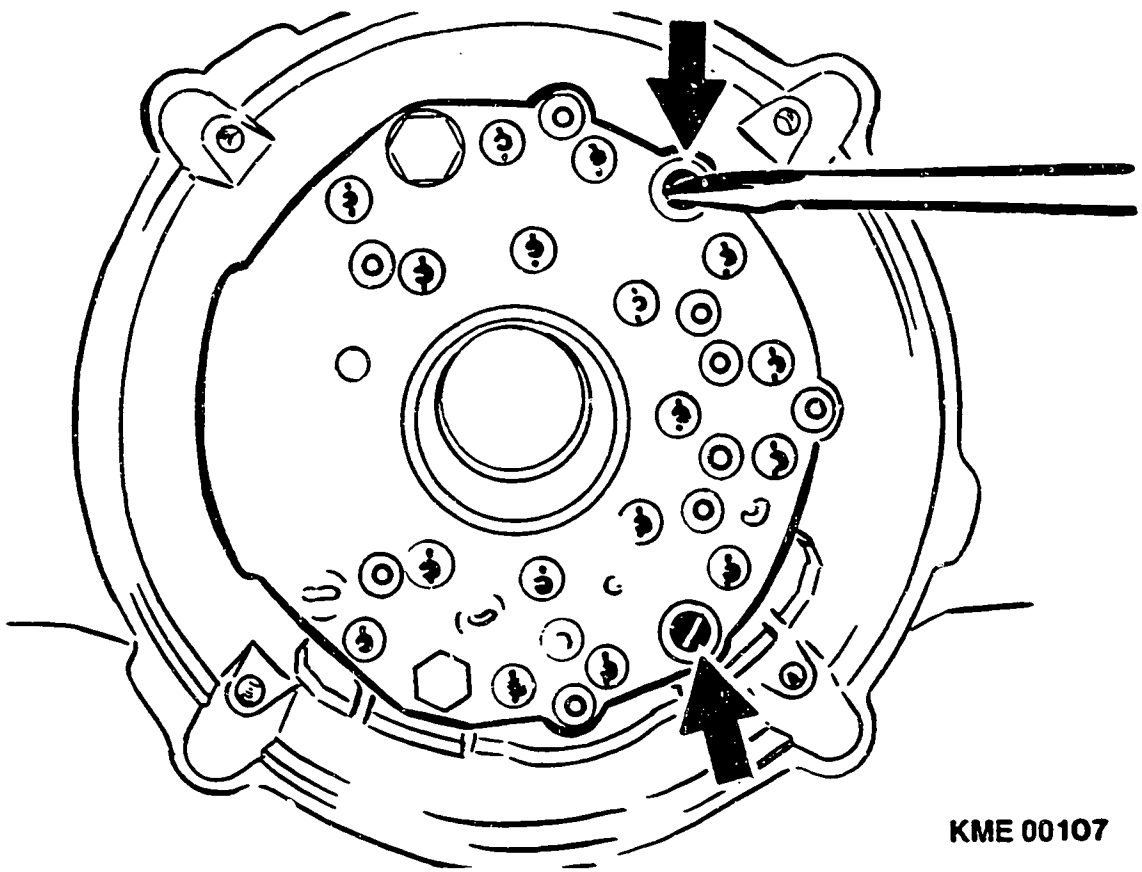
KME 00062

ALTERNATOR ASSEMBLY

Secure rectifier on alternator end with 2/3 combi-screws (see picture, arrows) depending on alternator version.

Tightening torque: 1.4...2.0 Nm

Continue: C07/1 Fig.: C06/2



KME 00107

ALTERNATOR ASSEMBLY

Installing stator and rotor:

Position stator at rectifier end shield. Cause the marks made at the collector-ring end shield and stator prior to disassembly of the alternator to coincide. Solder on connecting wires of stator (see picture).

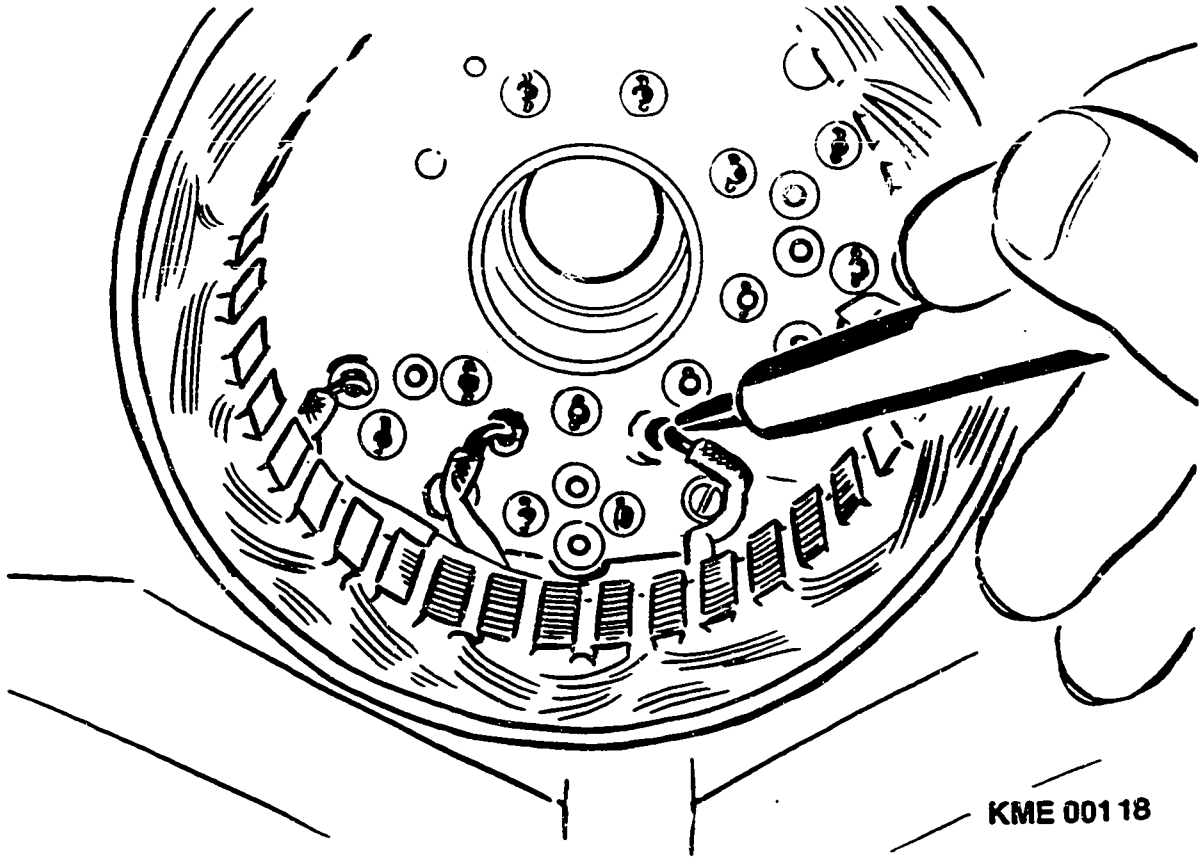
Make sure that connecting wires do not then catch on rotor. Carefully insert rotor with drive end shield.

Note: Do not use too much soldering tin to prevent shorting links.

Check cementing of wires at stator for damage.

Re-cement if necessary.

Continue: C08/1 Fig.: C07/2



KME 001 18

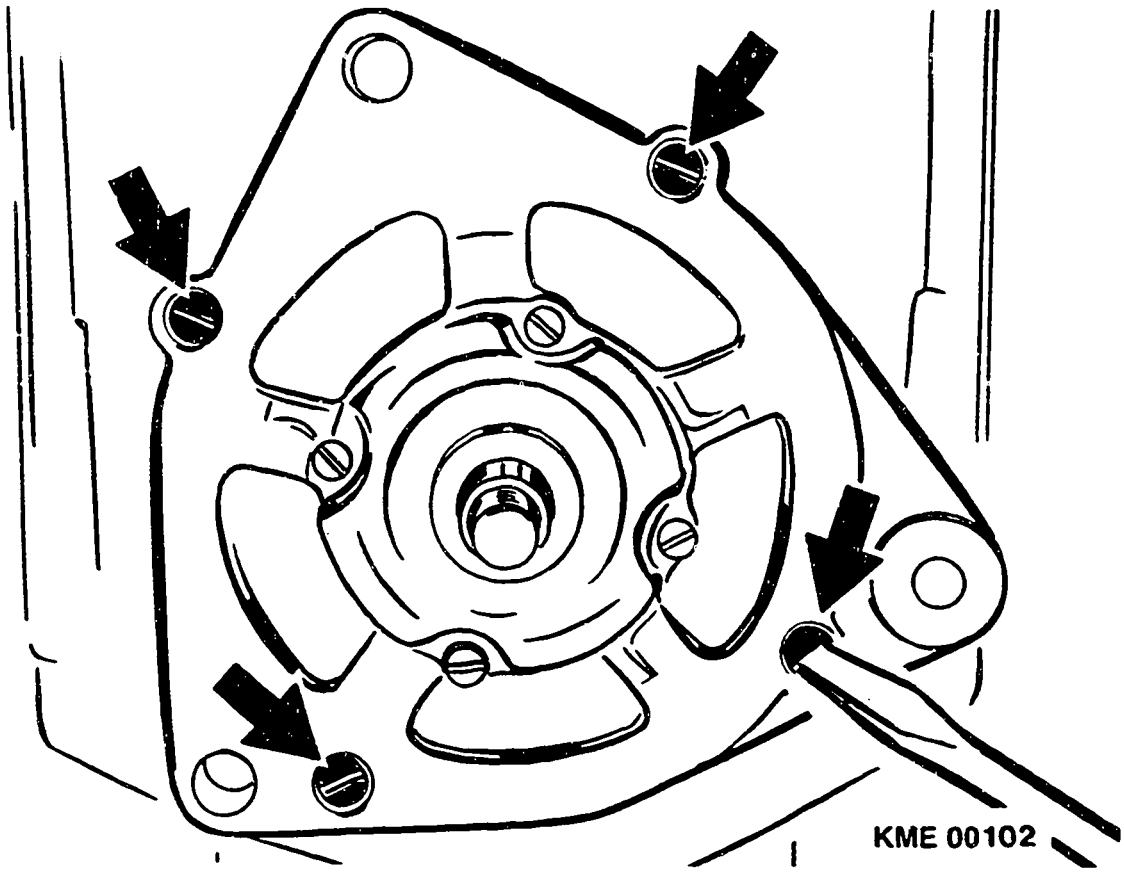
ALTERNATOR ASSEMBLY

In order to achieve proper concentricity of rotor and alignment of drive end shield with respect to collector-ring end shield, it is necessary to perform the following operations:

Insert three feeler gauges (120 degrees offset) between stator and rotor; gauge thickness 0.2 mm.
Position 4 fastening screws (picture, arrows) with screwdriver then tighten alternately with tightening torque

4.1...5.5 Nm

Continue: C09/1 Fig.: C08/2



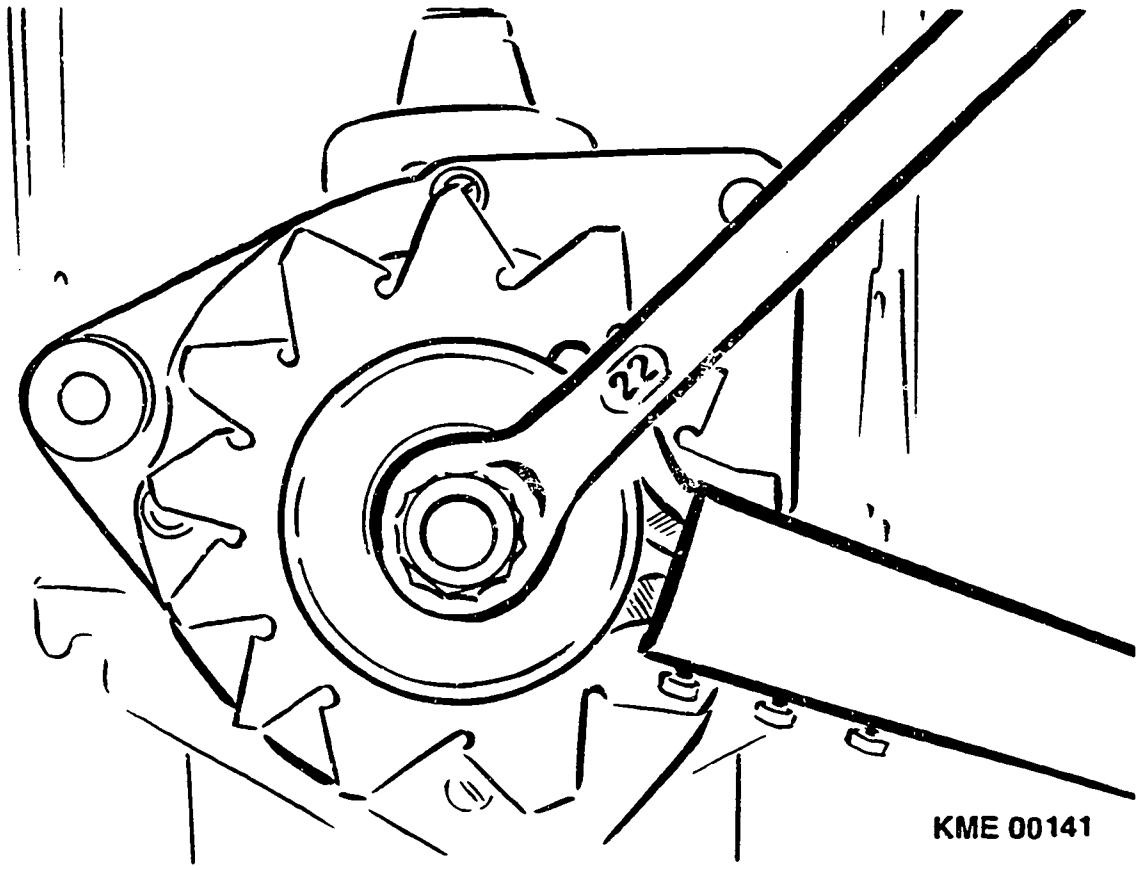
ALTERNATOR ASSEMBLY

Securing fan

Insert Woodruff key in groove. Slip NEW fan onto shaft ensuring correct position. Attach pulley components to shaft in correct sequence.
Use securing device KDLJ 6006 and 22 mm box wrench to tighten pulley.

Tightening torque 35 ... 45 Nm.

Continue: C10/1 Fig.: C09/2

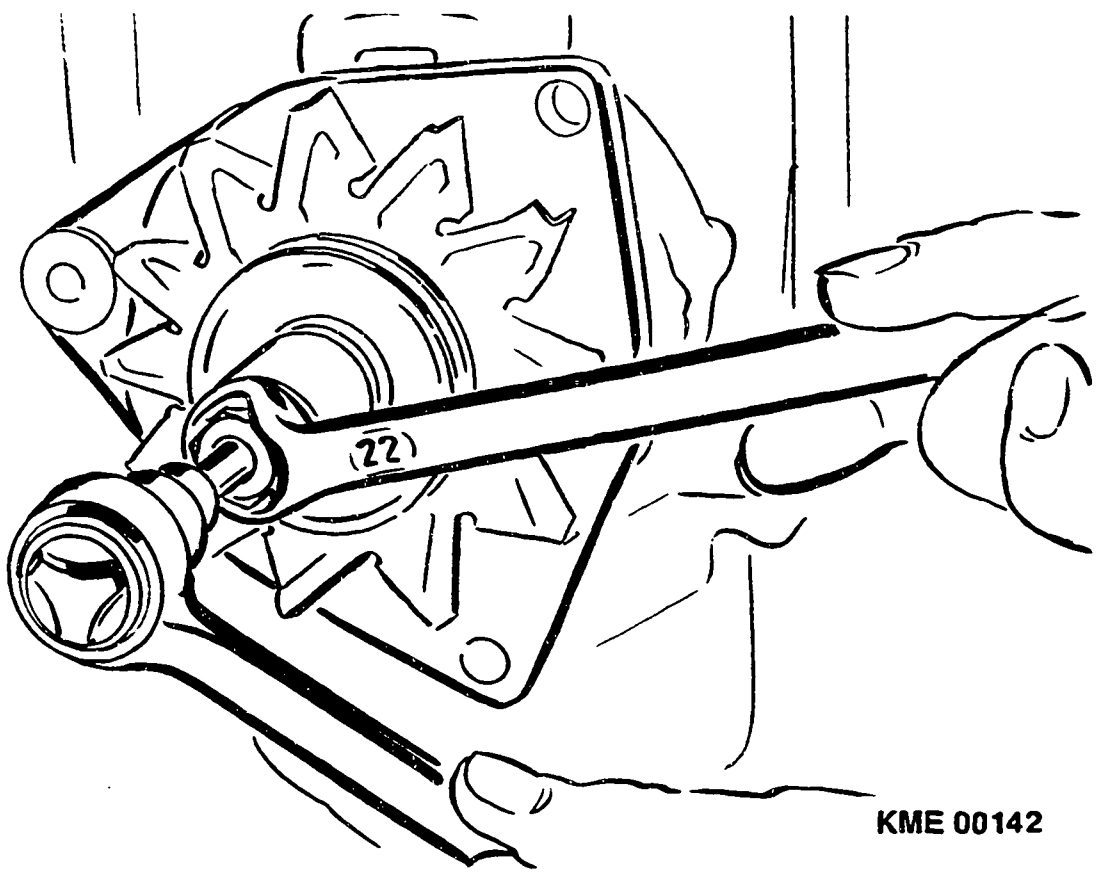


ALTERNATOR ASSEMBLY

Securing fan (hexagon socket in rotor shaft):

Slip NEW fan onto rotor shaft ensuring correct position. Attach pulley or pulley components in correct sequence to rotor shaft.
Hold rotor with hexagon socket 8 x 120.
Attach socket wrench KDLJ 6030 to nut and tighten pulley using 22 mm box wrench.
Tightening torque 45 ... 55 Nm

Continue: C11/1 Fig.: C10/2



KME 00142

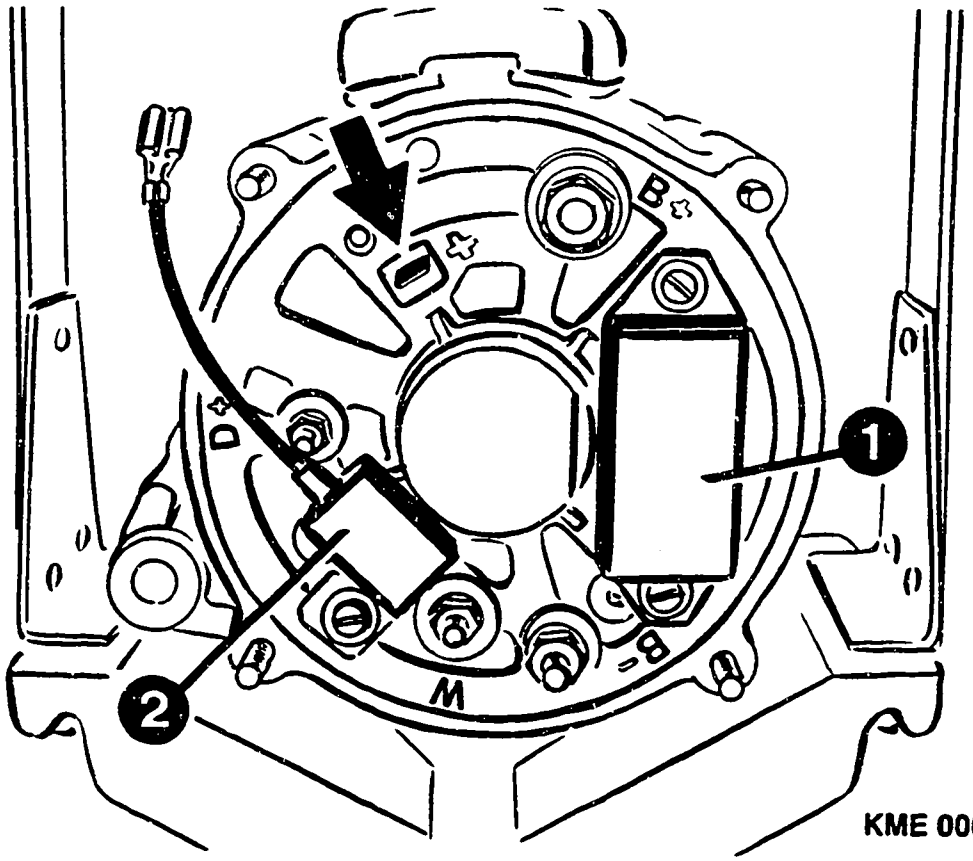
ALTERNATOR ASSEMBLY

Installing regulator and suppression capacitor:

Swivel regulator into collector-ring end shield and screw on with fastening screws (see picture).
Tightening torque: 1.6...2.3 Nm
Screw on suppression capacitor (see picture).
Tightening torque: 1.4...2.0 Nm
Attach plug of suppression capacitor to B+ plug-in connection.

1 = Electronic regulator with carbon-brush holder
2 = Suppression capacitor

Continue: C12/1 Fig.: C11/1



KME 00098

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Testers and devices:

Alternator test bench

	EFLJ 91	0 683 300 100
or	EFLJ 25..	0 680 110 ..
or	EFLJ 70 A	0 680 104 ..

or combination test bench
(only for loading up to max. 43 A)

EFAW 275..	0 681 107 ..

Continue: C12/2

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Testers and devices:

Mounting plate

EFLJ 66/3	

for clamping alternators with hinge mounting onto alternator test bench

EFLJ 25, 70	

Parts set	1 687 000 042

for clamping alternators with hinge mounting onto combination test bench

EFAW 275 ..	

Continue: C13/1

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Testers and devices:

Alternator Tester	WPG 012.00	0 681 101 403

For additional check or test:

Ignition oscilloscope (all versions)
or
Bosch engine tester (all versions)

Continue: C13/2

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Clamp alternator into position on test bench:

Alternators with swivel arm or flange mount are only to be clamped on using the appropriate clamping fixture.

To ensure power output of test-bench engine is sufficient, only perform tests with suitable fan pulley.

Be sure to select correct transmission ratio.

Continue: C14/1

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Transmission ratio 0.3 : 1 applies to test bench EFLJ 25.
This means that in the case of an alternator pulley with 100 mm diameter for example to be made of a test-bench pulley with a diameter of 350 mm.

Transmission ratio 0.4 : 1 applies to test bench EFLJ 70A.
This means that in the event of an alternator pulley with a diameter of 100 mm for example the test-bench pulley to be used must have a diameter of 250 mm.

Continue: C14/2

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Clamp alternator in position on test bench:

N o t e :
If, in the event of extremely high alternator power, the drive power of the test bench engine is not sufficient, then only perform test to the extent that the test speed does not drop off at the required test current.

The charge indicator lamp must be completely off during the power-output test.

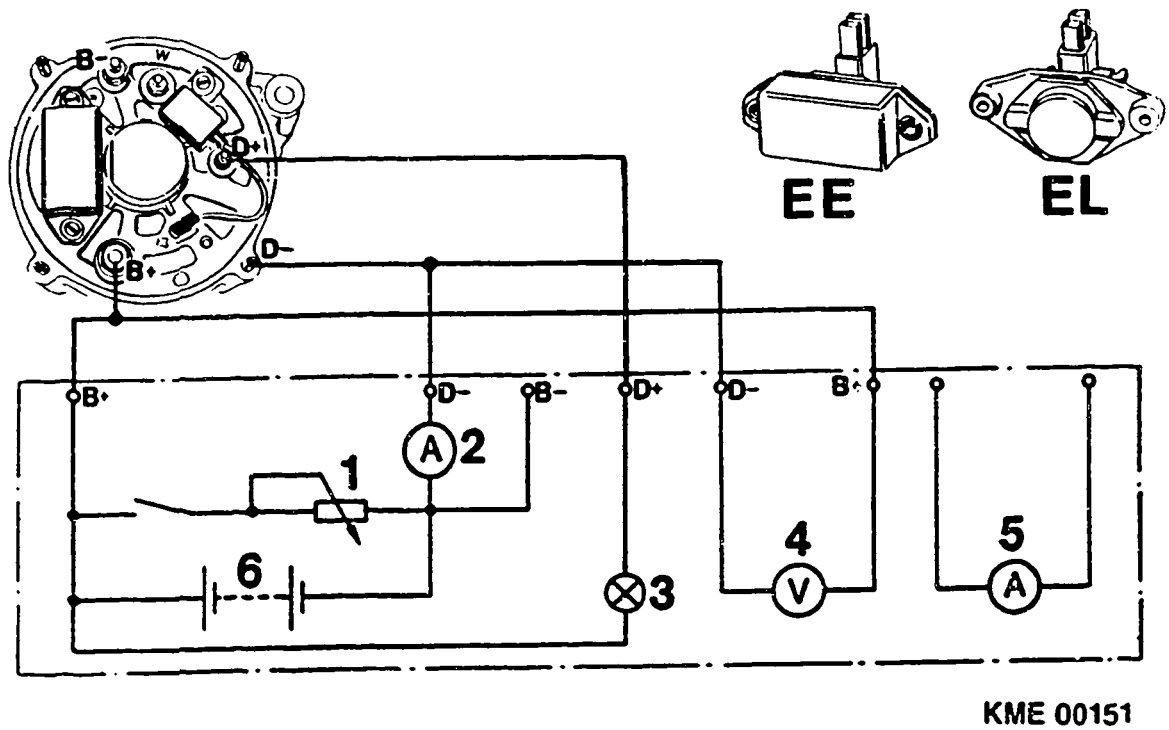
Continue: C15/1

CHECKING OF ALTERNATOR WITH REGULATOR ON TEST BENCH

Connection diagram for EE and EL regulator 0 192 052 .., 1 197 311 ..

1 = Load resistor
2 = Ampere tester
3 = Indicator lamp
4 = Voltage tester (regulated voltage)
5 = Ampere tester
6 = Test-bench battery

Continue: C16/1 Fig.: C15/2



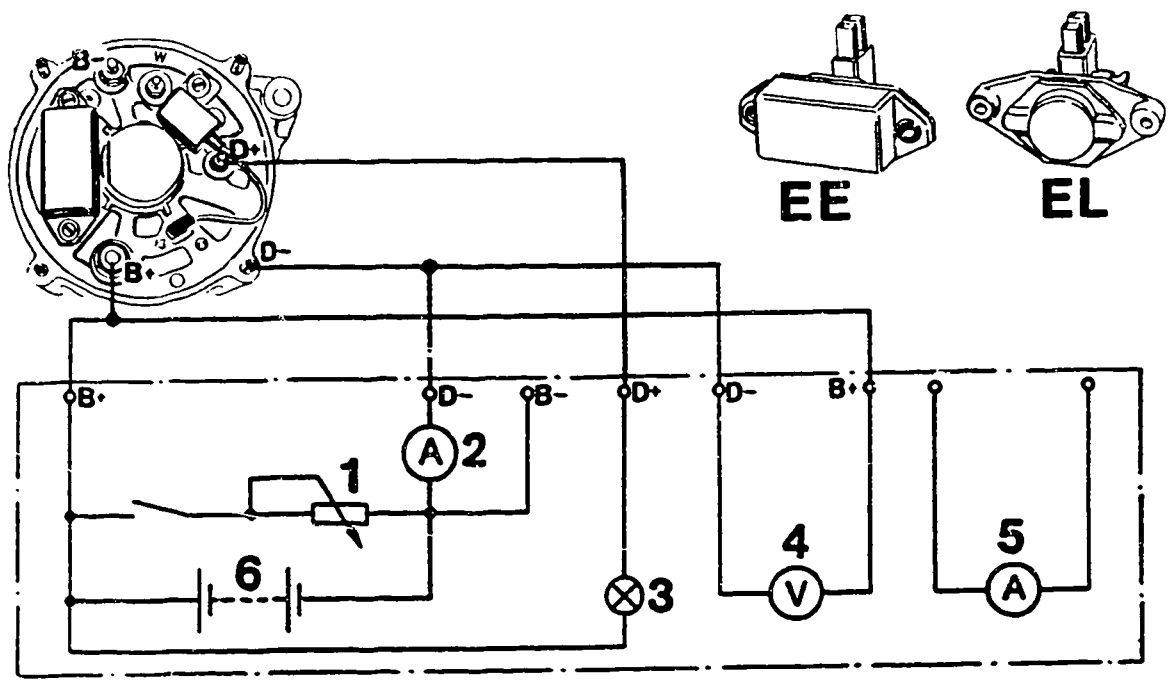
KME 00151

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Connection of alternator to test bench:
Connect battery positive lead of test bench to B+ of alternator.

If clamping table on test bench is used as ground lead, make sure that no contact resistances are produced.
In the case of high-power alternators, it is advantageous to connect the battery negative lead of the test bench directly to the alternator.
Connect up voltage tester between B+ and B-.

Continue: C17/1 Fig.: C16/2

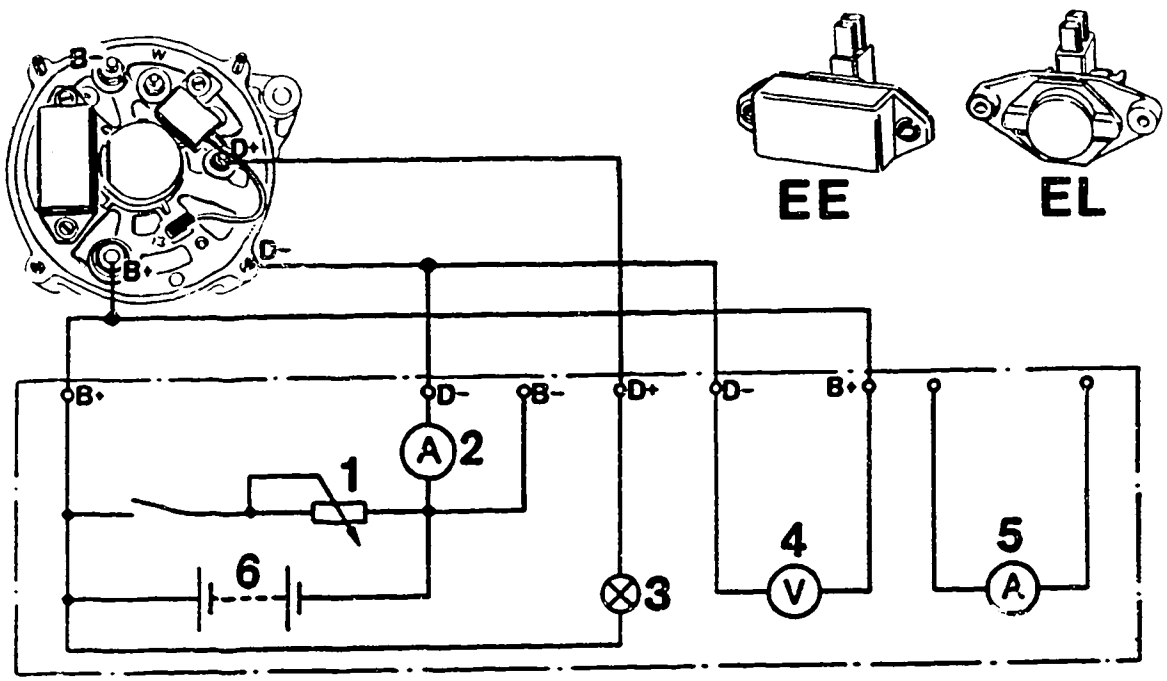


KME 00151

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Pay particular attention to the following:
All connections at test bench must be in perfect condition.
When alternator is running, the connection between the alternator and battery must not be detached, as otherwise the semiconductors in the alternator and regulator might be destroyed.
Never operate alternator without connected battery. If a direction of rotation is indicated on the fan pulley or on the alternator, then the alternator is only to be operated in this direction of rotation.

Continue: C18/1 Fig.: C17/2



KME 00151

TESTING ALTERNATOR WITH REGULATOR ON TEST BENCH

Power-output test with regulator:

N o t e :

When performing power-output test, ensure that current-limiting resistor installed in test bench is not switched into circuit, as otherwise the charge indicator lamp glows and simulates a fault in the alternator.

Keep the alternator voltage of 13 V constant by varying the load current IL.

Continue: C18/2

CHECKING OF ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V32/65A	1 500	32	30
	6 000	62	5
N1->14V32/70A	1 500	31	30
	6 000	66	5
N1->14V31/75A	1 500	33	30
	6 000	70	5

Continue: C19/1

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V29/80A	1 500	31	30
	6 000	75	5
N1->14V31/80A	1 500	33	30
	6 000	78	5
N1->14V36/80A	1 500	38	30
	6 000	77	5

Continue: C19/2

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V29/90A	1 500	32	30
	6 000	85	5
N1->14V32/90A	1 500	37	30
	6 000	89	5
N1->14V34/90A	1 500	38	30
	6 000	86	5

Continue: C20/1

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V40/90A	1 500	42	30
	6 000	84	5
N1->14V31/100A	1 500	33	30
	6 000	93	5
N1->14V36/100A	1 500	36	30
	6 000	100	5

Continue: C20/2

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V40/100A	1 500	44	30
	6 000	99	5
N1->14V35/105A	1 500	37	30
	6 000	98	5
N1->14V35/110A	1 500	35	30
	6 000	110	5

Continue: C21/1

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V40/110A	1 500	45	30
	6 000	103	5
N1->14V10/115A	1 500	10	30
	6 000	107	5
N1->14V35/115A	1 500	38	30
	6 000	107	

Continue: C21/2

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

Alternator 0 120 45. .. 0 120 46. ..	Speed (min-1)	Load current IL (A)	Test durat. min.
N1->14V40/115A	1 500	44	30
	6 000	113	5
N1->14V25/135A	1 500	35	30
	6 000	135	5
N1->14V25/140A	1 500	30	30
	6 000	138	5

Continue: C22/1

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH

Performance test with regulator:

I m p o r t a n t:

Pay attention to accident prevention regulations!

Following completion of testing, allow alternator (if possible) to run at approx. 10 000 min-1.

Continue: C22/2

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH
Checking regulated voltage:

Cause alternator to assume speed of 6000 min-1. Check whether regulator is in regulated-voltage range.

Load current less than/equal to 10 A

Regulator part no. 0 192 052 ..	Regulated voltage (V)
..001, ..002, ..004 ..005, ..006, ..007 ..008, ..010, ..011 ..012, ..013, ..014	13.7-14.5

Continue: C23/1

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH
Checking regulated voltage:

Load current less than/equal to 10 A

Regulator part no. 0 192 052 ..	Regulated voltage (V)
..015, ..016, ..017	13.7–14.5
..018, ..020, ..021 ..022, ..024, ..025 ..026, ..027	13.7–14.5
..019, ..023,	14.3–14.9

Continue: C23/2

CHECKING ALTERNATOR WITH REGULATOR ON TEST BENCH
Checking regulated voltage:

Load current less than/equal to 10 A

Regulator part no. 1 197 311 ..	Regulated voltage (V)
..001, ..003, ..004 ..005, ..009, ..010 ..011, ..021, ..023 ..027, ..030,	13.7–14.5
..008, ..026, ..028	14.1–14.9
..800,	14.1–14.9

Continue: C24/1

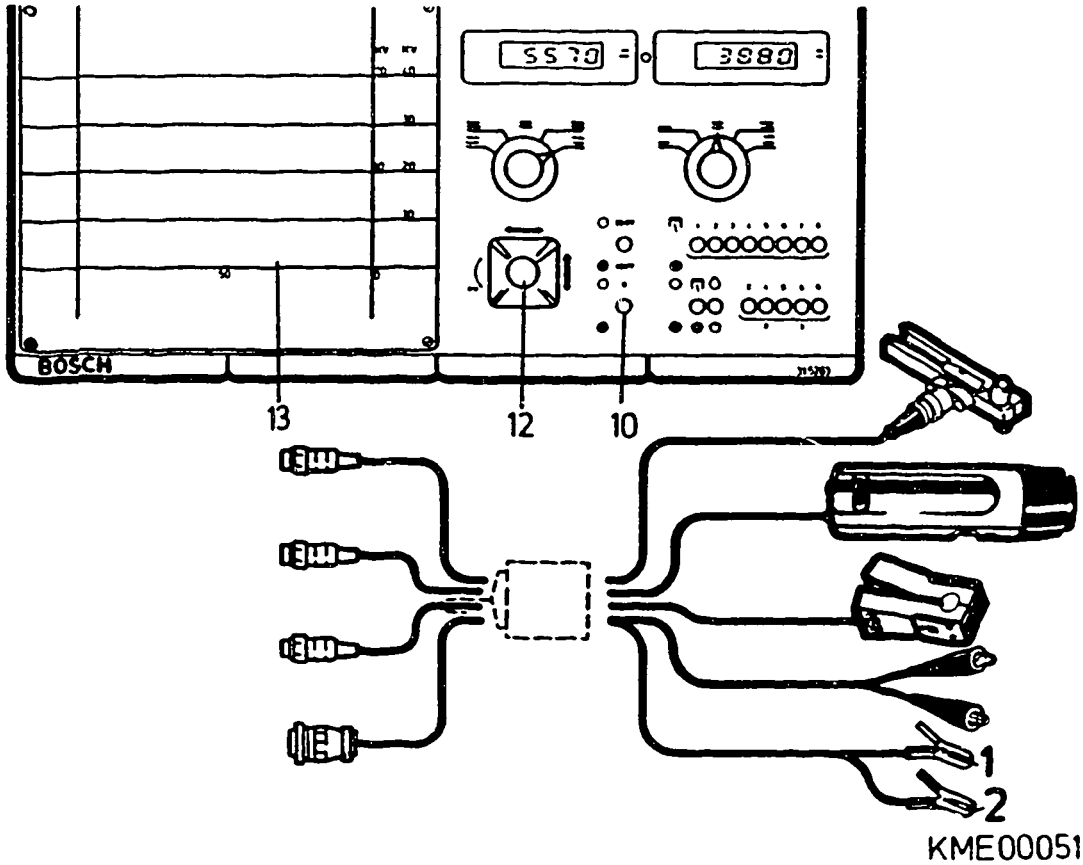
TESTING WITH OSCILLOSCOPE

Connect oscilloscope (MOT 002.00) to alternator by way of appropriate test lead.

Red terminal (1) to D+ connection.

Black terminal (2) to B- connection (ground).

Continue: C25/1 Fig.: C24/2



KME00051

SETTING AND EVALUATING OSCILLOGRAM

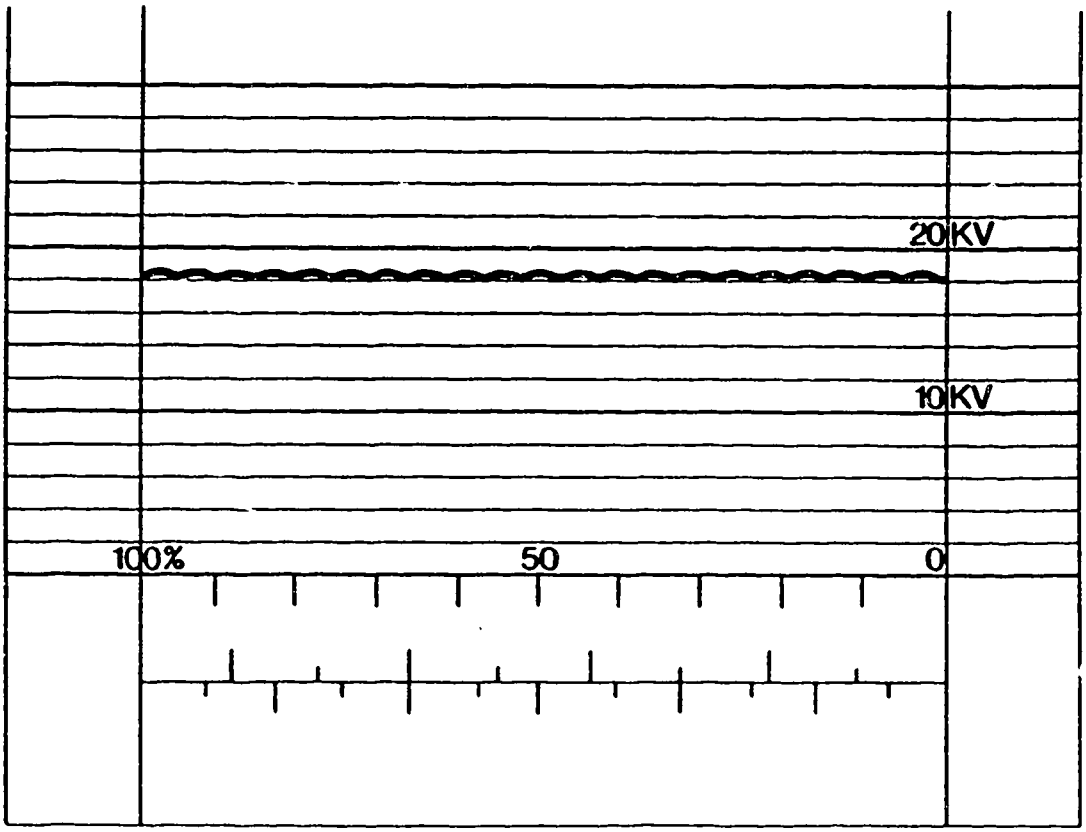
This is the image shown by an alternator which is in perfect working condition.

The D.C. voltage supplied has a low harmonic content.

Small spikes may be superimposed on the oscillogram indicated if the alternator regulator is in operation.

The regulator can be shut down by connecting up a load (e.g. load resistor).

Continue: C26/1 Fig.: C25/2

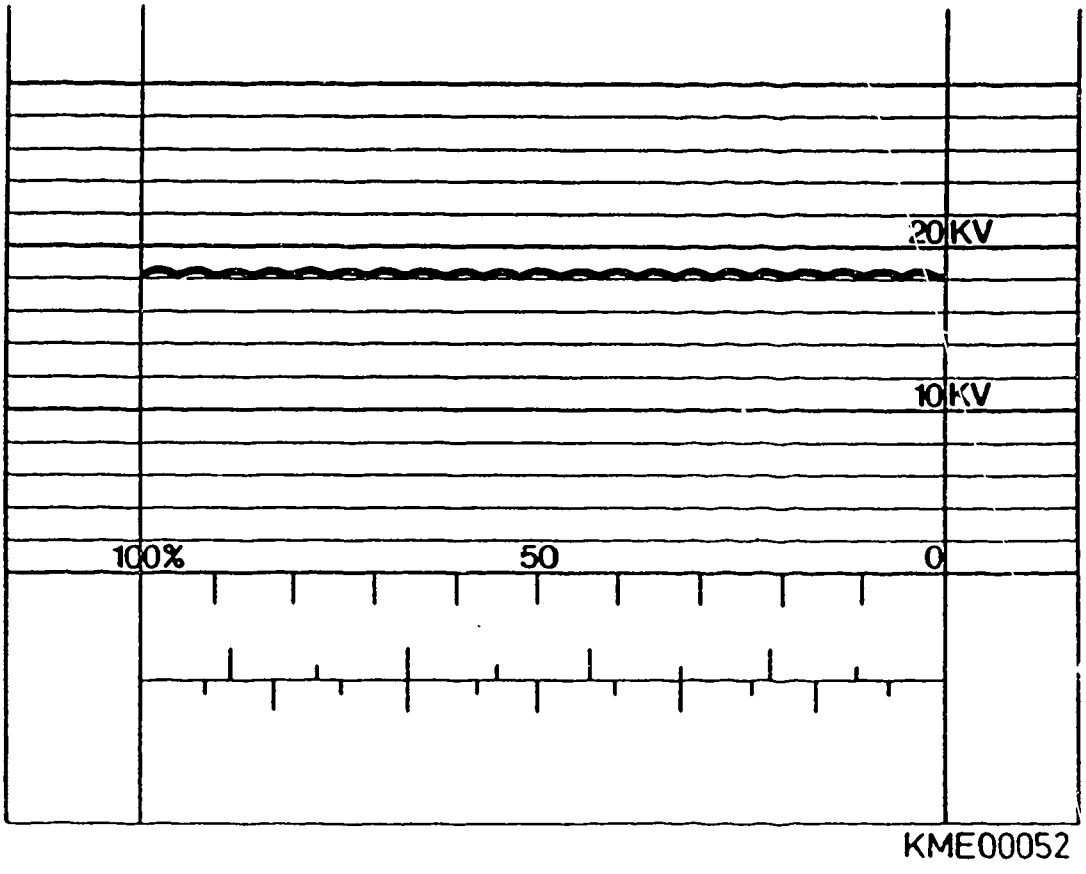


SETTING AND EVALUATING OSCILLOGRAM

In order to be able to compare such images, the respective image is to be adjusted at the oscilloscope vertical control such that it approximately fits in between the 10 and 20 kV division.

N o t e : Several faults can occur together.

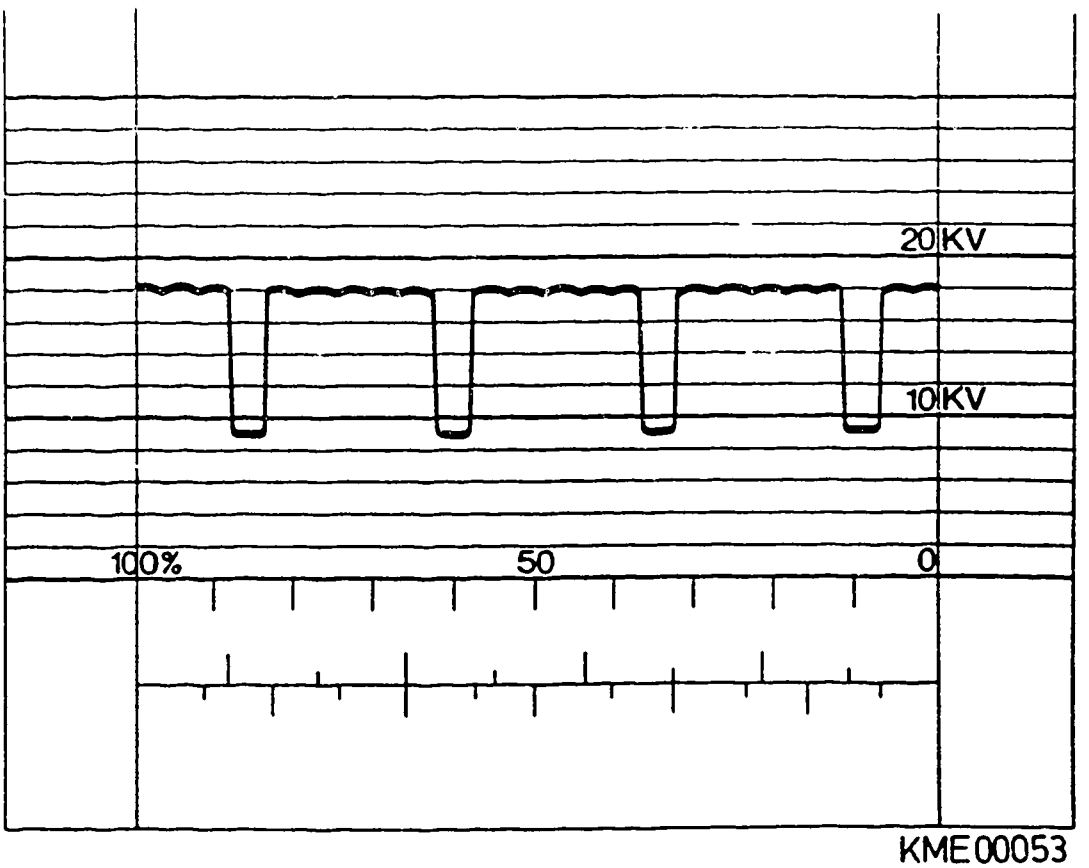
Continue: C27/1 Fig.: C26/2



SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows open-circuit in exciter diode.

Continue: C28/1 Fig.: C27/2

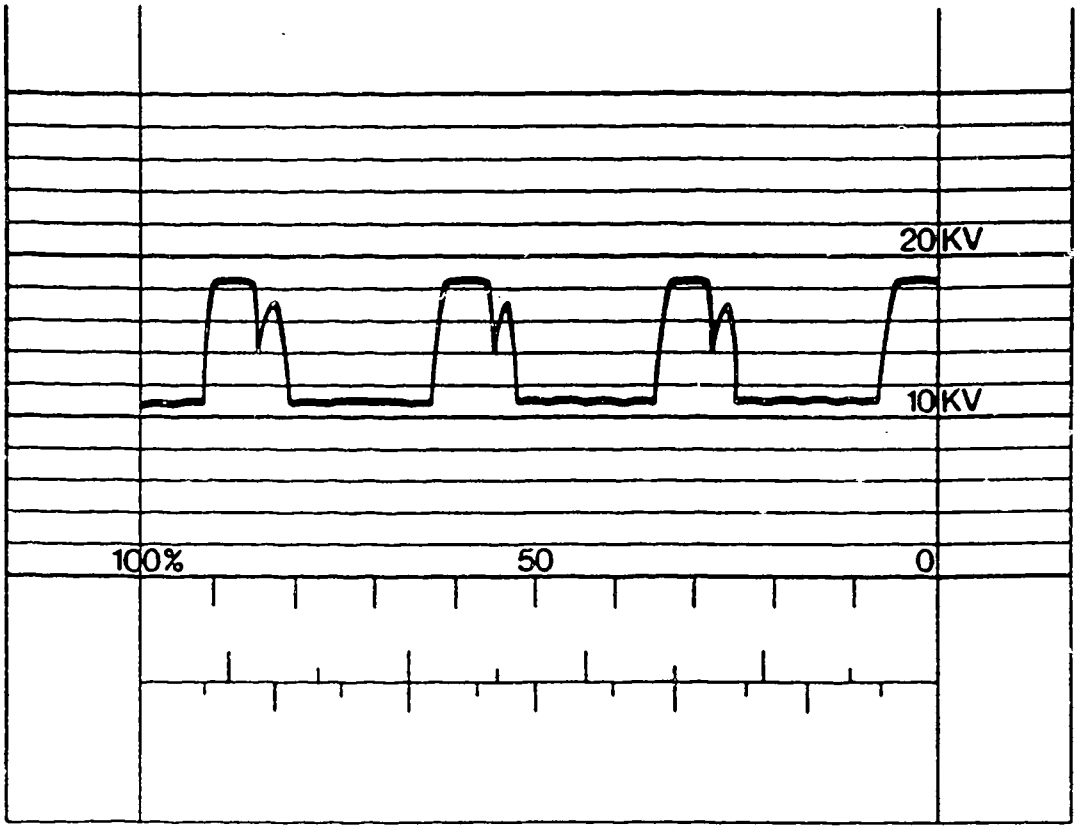


SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows open-circuit in positive diode.

If several diodes are connected in parallel on an alternator, this oscillogram appears only if there is an open-circuit in all diodes.

Continue: D01/1 Fig.: C28/2

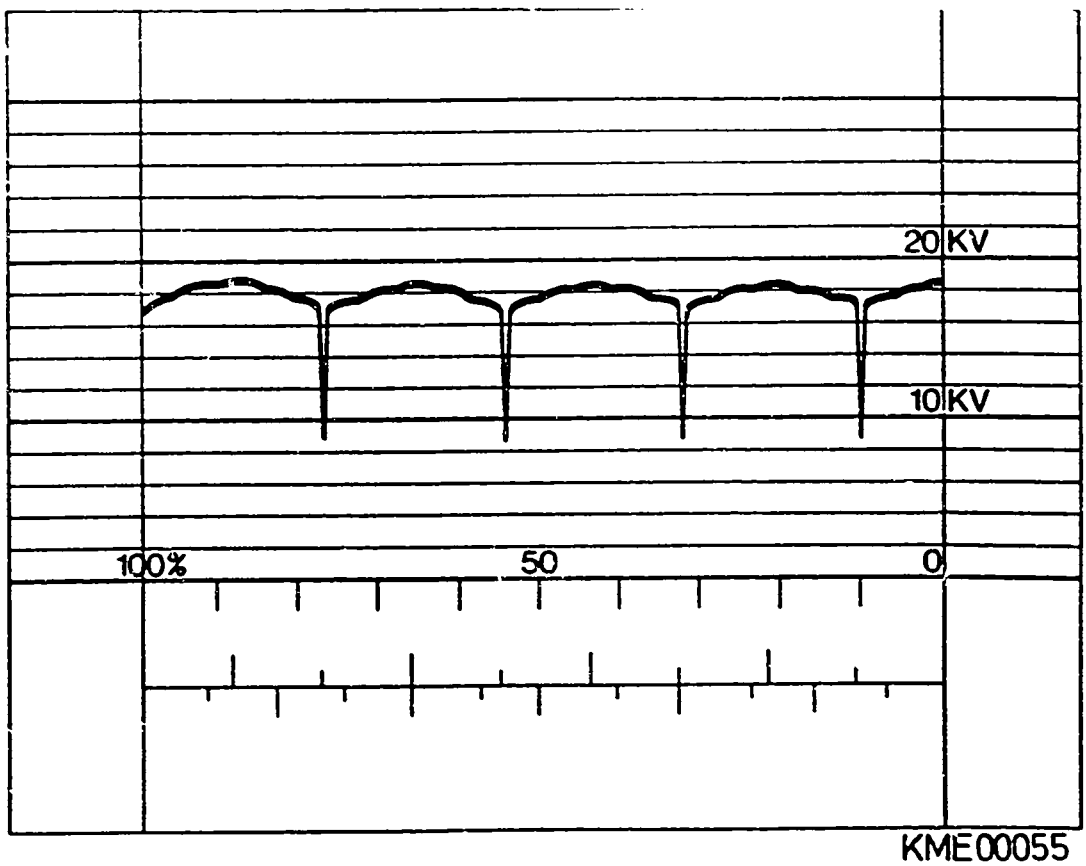


SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows open-circuit in negative diode.

If several diodes are connected in parallel on an alternator, this oscillogram appears only if there is an open-circuit in all diodes.

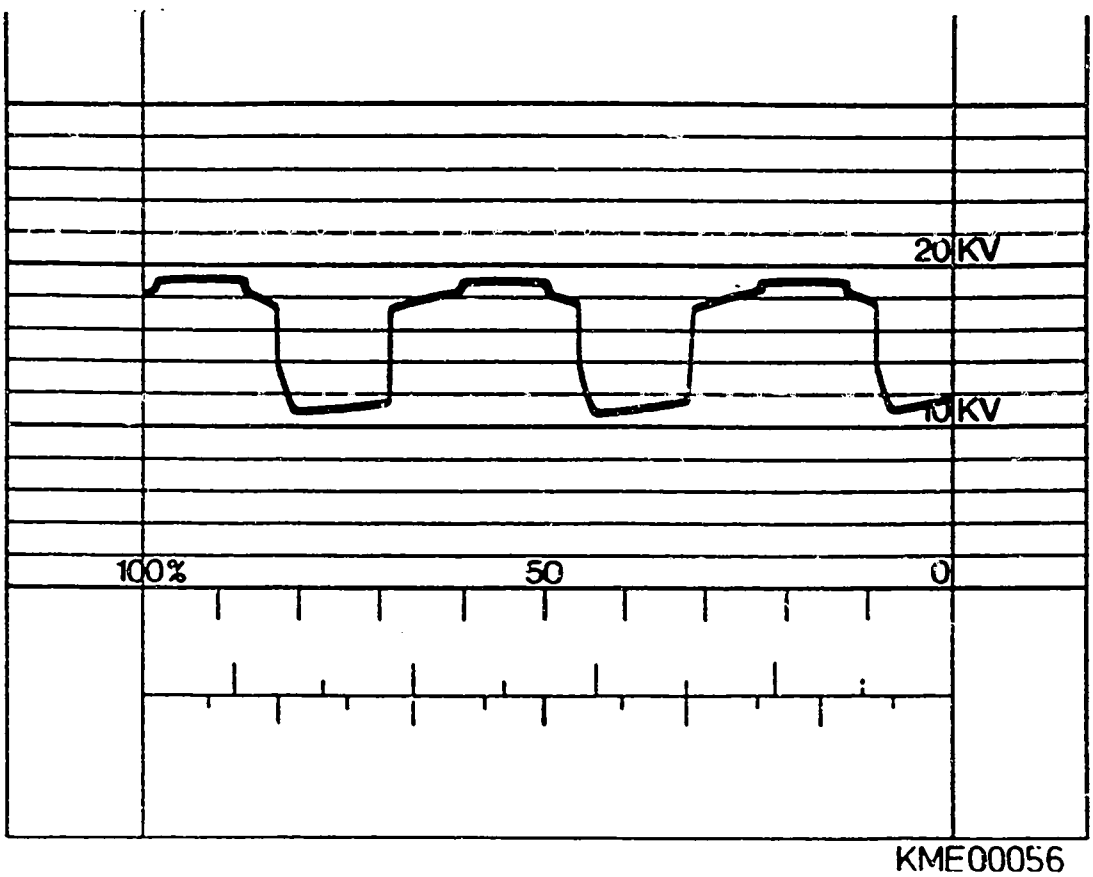
Continue: D02/1 Fig.: D01/2



SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows short-circuit in exciter diode.

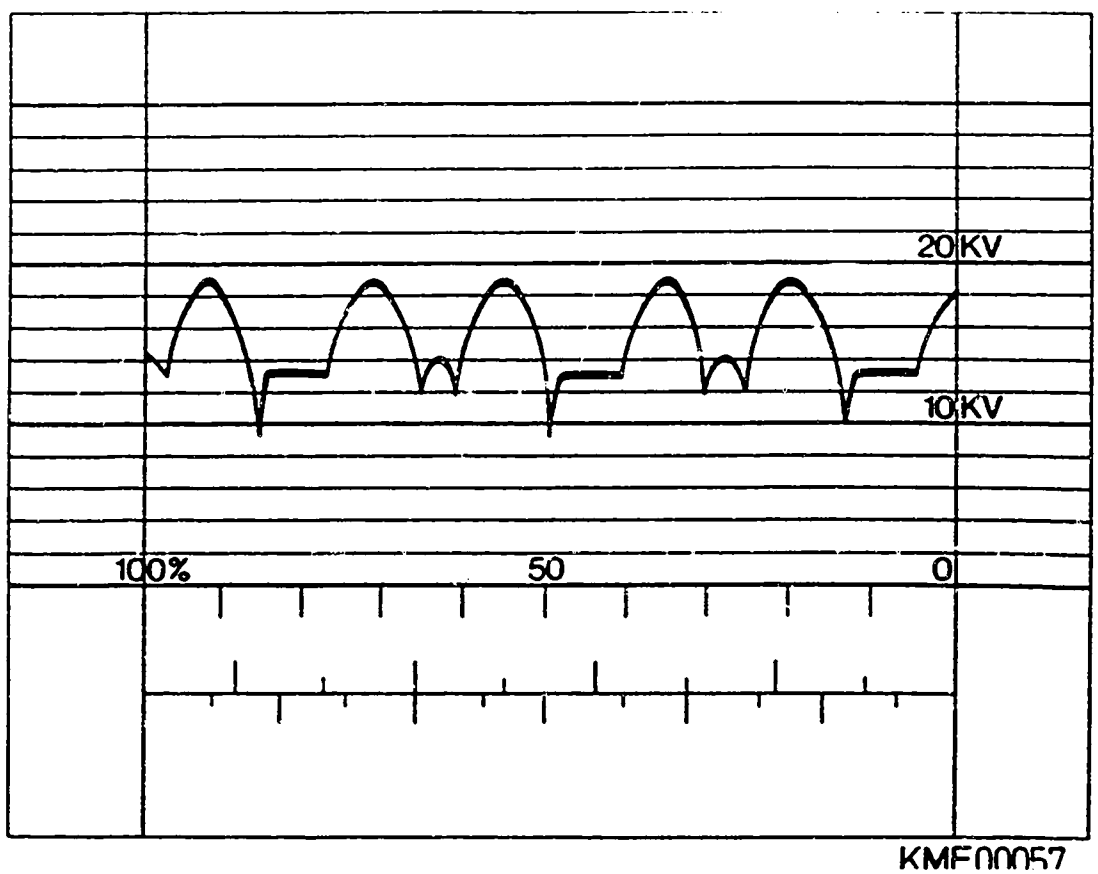
Continue: D03/1 Fig.: D02/2



SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows short-circuit in one or more positive diodes.

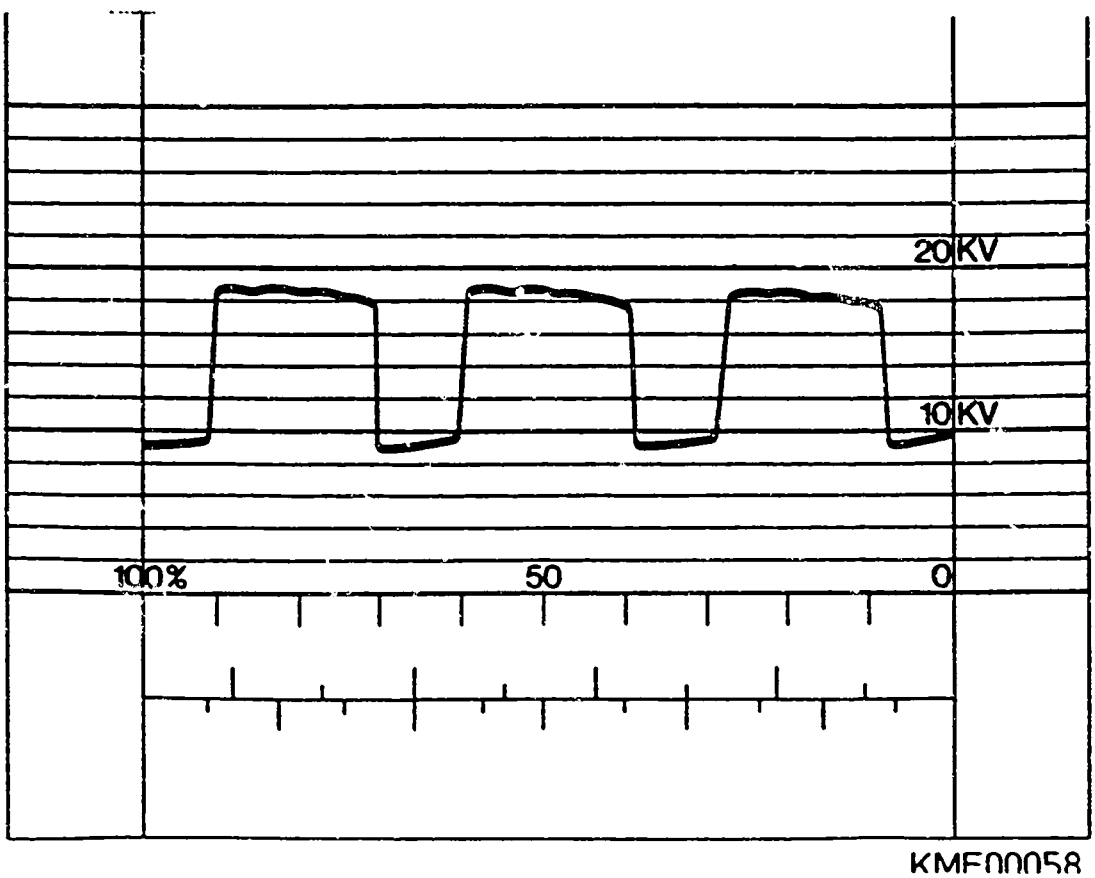
Continue: D04/1 Fig.: D03/2



SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows short-circuit in one or more negative diodes.

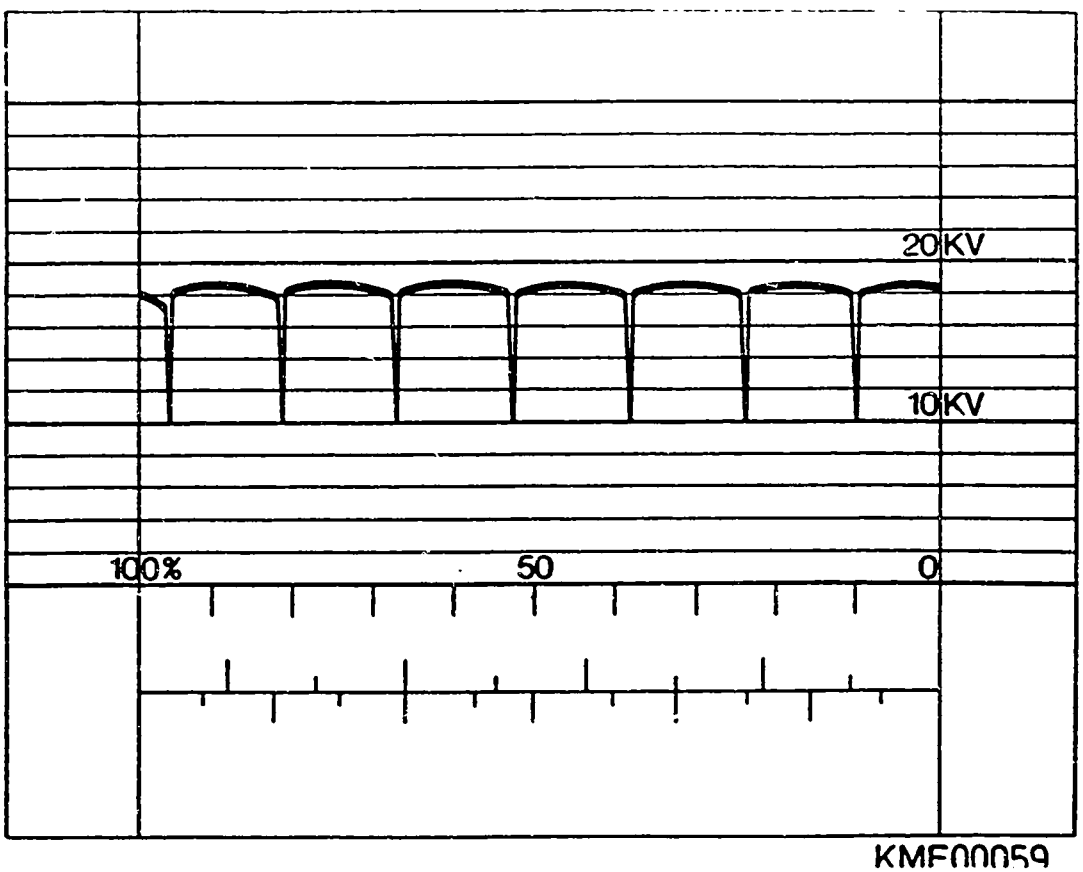
Continue: D05/1 Fig.: D04/2



SETTING AND EVALUATING OSCILLOGRAM

Oscillogram shows phase error (open-circuit).

Continue: N25/1 Fig.: D05/2



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